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Canonie Environmental

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BENCH-SCALE TREATABILITY STUDY
SOILTECH ANAEROBIC THERMAL PROCESS
AMERICAN CHEMICAL SERVICES NPL SITE
GRIFFITH, INDIANA

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1.0 INTRODUCTION

Canonie Environmental Services Corp. (Canonie) and SoilTech ATP Systems, Inc. (SoilTech) conducted bench-scale tests to determine the effectiveness of a low temperature thermal desorption process, the SoilTech Anaerobic Thermal Process (ATP) System, for removing contaminants from soil and waste samples from the American Chemical Services (ACS) National Priority List (NPL) site in Griffith, Indiana. Soils and wastes at the ACS site contain volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and polychlorinated biphenyls (PCBs). The overall objectives of the tests were to determine the effectiveness of the ATP system in removing the contaminants from the source material and to assess the viability of the full-scale ATP System in treating the soils and wastes at the ACS site.

Tests were conducted on the samples according to normal procedures and no significant variations or changes were necessary. The standard retort test temperatures of 1000°F and 1100°F were used and the duration of each retort test was the same as SoilTech's standard, approximately 30 minutes.

The test data indicated that the ATP System is well suited for treating material from the ACS site. Specifically, the tests provided the following information:

1. PCBs were reduced to nondetectable levels [with a detection limit of 1000 micrograms per kilogram (µg/kg) or parts per billion (ppb)] in the three treated samples, half the remediation level specified in the Request for Proposal (RFP). Total recoverable petroleum hydrocarbons (TRPH) were also

reduced to nondetectable levels. (SoilTech has demonstrated at commercial scale that the target PCB concentration of 2000 ppb or less can be achieved.)

2. Concentrations of VOCs and SVOCs were reduced to non-detect levels or, if detected, to levels below the remediation levels/cleanup goals. The exceptions to this are further explained in Section 3.2. These exceptions are where analysis indicated the compound was not present but the detection limit was above the remediation level.

3. The total organic carbon (TOC) present in the feed material was significantly reduced by the ATP System. However, some TOC was present in the treated soil indicating the presence of carbonaceous material which was not combustible at temperatures of up to 1200 degrees Fahrenheit (°F). A more extensive discussion of TOC analysis is provided at the end of Section 3.2.

4. Liquid products of the ATP System are treatable by conventional treatment methods. The aqueous liquid product (water) generated by the treatment process can be treated in an on-site or off-site water treatment system. If treated on-site, the treated water can be used to cool and reduce dusting of the combusted material which exits the ATP System. The organic liquid product (oil) generated by the treatment process can be sent off-site for disposal.

Described below are a summary of project activities, a description of the waste stream, and a description of the ATP Technology.

1.1 Summary of Project Activities

Canonie was contracted by Warzyn, Inc. (Warzyn) to conduct a bench-scale treatability study on three representative samples from the ACS site using the low temperature thermal desorption system - ATP. Canonie and SoilTech (a Canonie affiliate which provides full-scale ATP services within the United States) completed the treatability study in accordance with their proposal, the contract, and correspondence received from Warzyn.

SoilTech maintains laboratory space at the facility of Hazen Research, Inc. (Hazen) in Golden, Colorado, for the operation of the ATP bench-scale unit. All bench-scale ATP tests and operations are conducted by Hazen personnel under SoilTech's direction. For the ACS treatability study, all the bench-scale tests were conducted at the Hazen facility using a bench-scale ATP System and Hazen personnel.

Three initial source samples from the ACS site were collected and sent to Hazen by Warzyn. Hazen identification numbers (HRI No.) were assigned to each sample and are cross-referenced below with Warzyn's designation numbers.

Warzyn Designation	HRI No.	Sample Location
ACS-COTREAT 02-02	46532-1	Treatment Lagoon Area
ACS-COOFF 02-01	46532-2	Off-Site Containment Area
ACS-COOFF 03-01	46532-3	Off-Site Containment Area (spiked)

A representative subsample of each source sample was collected by Hazen and analyzed for PCBs and SVOCs on an expedited turnaround. Analyses were conducted by Vista Laboratories, Inc. (Vista) of Colorado. Analytical results indicated that the

PCB concentration for each of the source samples was below 100 parts per million (ppm) or milligrams per kilogram (mg/kg). After reviewing the results, Warzyn concluded that the samples may not meet their requirements and therefore, additional field sampling was warranted.

Warzyn conducted a second round of field sampling and sent two additional source samples to Hazen. Hazen's identification numbers (HRI No.) are cross-referenced with Warzyn's designation as shown below.

Warzyn Designation	HRI No.	Sample Location
ACS-TP02A-01	46532-4	On-site Containment Area (spiked)
ACS-TP02A-02	46532-5	On-site Containment Area

After reviewing the analytical results, these samples were not considered to be representative of the weighted average VOC and SVOC concentrations in the waste matrix based on the remedial investigation (RI) data.

Warzyn then decided that Sample HRI 46532-2 (ACS-COOFF 02-01, Off-site Containment Area) could be used as a feed sample, and Samples HRI 46532-3 [ACS-COOFF 03-01, Off-site Containment Area (spiked)] and HRI 46532-4 [ACS-TP02A-01, On-site Containment Area (spiked)] would be suitable for the treatability study only if the concentrations of PCBs and SVOCs in these samples could be augmented with spiking solutions. Warzyn prepared the spiking solutions and sent them to Hazen along with mixing instructions. The spiking solution concentrations and resulting spiked soil concentrations, as anticipated by Warzyn, are tabulated below.

Set 1 for Sample HRI 46532-3 ACS-COOFF 03-01, Off-Site Containment Area, spiked		
Compound	Concentration per Aliquot (mg/kg)	Anticipated Spiked Soil Concentration (mg/kg)
Aroclor 1248	600	200
1,1,1-Trichloroethane	15,000	5,000
Benzene	6,000	2,000
Isophorone	3,000	1,000
bis(2-ethylhexyl)phthalate	2,100	700

Set 2 for Sample HRI 46532-4 ACS-TP02A-01, On-site Containment Area, spiked		
Compound	Concentration per Aliquot (mg/kg)	Anticipated Spiked Soil Concentration (mg/kg)
1,1,1-Trichloroethane	45,000	15,000
Tetrachloroethane	9,000	3,000
Methyl ethyl ketone	9,000	3,000
Trichloroethene	3,000	1,000
bis(2-ethylhexyl)phthalate	2,100	700
bis(2-chloroethyl)ether	225	75
Chrysene	90	30
Aroclor 1248	1,500	500

Hazen spiked Samples HRI 46532-3 [ACS-COOFF 03-01, Off-site Containment Area (spiked)] and HRI 46532-4 [ACS-TP02A-01, On-site Containment Area (spiked)] with spike solutions Set 1 and Set 2, respectively. Thus, one unspiked sample [HRI 46532-2 (ACS-COOFF 02-01, Off-site Containment Area)] and two spiked

samples (HRI 46532-3 [ACS-COOFF 03-01, Off-site Containment Area) and 46532-4 (ACS-TP02A-01, On-site Containment Area) were prepared and tested during the treatability study.

All the treatability test runs were conducted between January 13 and January 29, 1993. Untreated samples of the spiked feed material were collected and sent to Warzyn for analyses. Samples of unspiked feed material, all the treated material and other residual streams generated during the study were collected and analyzed through Hazen and other laboratories. Details on the test procedures and on sampling and analyses are presented in Section 2.0.

A treatability study report prepared by Hazen is presented in Appendix A.

1.2 Waste Feed Stream Description

A brief description of the source materials subjected to testing is provided below. A detailed description can be found in Appendix A.

The following observations were made by Hazen regarding the color, matrix, and other characteristics of the source material:

- HRI 46532-2 (ACS-COOFF 02-01, Off-site Containment Area): This was a brown-grey granular mud material with approximately one-half inch of brown water standing on top. Several brown and white pebbles were also observed. The sample was easily mixed by hand and resembled thick, wet concrete. The moisture content for the sample was determined to be 21.7 percent (wet basis)

and the ash was 71.3 percent. Loss on ignition for the ash material was 1.42 percent.

- HRI 46532-3 [ACS-COOFF 03-01, Off-site Containment Area (spiked)]: This was a moist dark brown to black soil. The material contained some rocks up to one-half inch in diameter, humus, and a few tan clay chunks that broke apart easily. The moisture content for the sample was determined to be 18.6 percent, and the ash was 75.3 percent. Loss on ignition for the ash material was 2.15 percent.

- HRI 46532-4 [ACS-TP02A-01, On-site Containment Area (spiked)]: This was a tan sludge material with dark brown crystals up to 2 inches in diameter, some sand or dirt, and some black streaks of an oil-like substance. The crystals broke up into small flakes with agitation. The moisture content for the sample was determined to be 29.2 percent, and the ash was 47.5 percent. Loss on ignition for the ash material was 0.87 percent.

Particle-size data for the source (feed) samples are presented in Tables 1 through 4 of Appendix A. A graphical depiction of the particle-size data is presented on Figures 1 through 3 of Appendix A.

1.3 Remedial Technology Description

The ATP Technology was originally conceived as a means of performing primary refining of tar sands and oil shales to crude oil in the early 1970s. UMATAC Industrial Processes (UMATAC) of Canada developed and tested the technology over a period of more than 15 years with funding from the Alberta Oil Sands Technology Research

Authority (AOSTRA). In 1988, Canonie entered into an exclusive licensing agreement to utilize the technology for waste treatment in the United States. Together, Canonie and UMATAC formed SoilTech and are equal partners in its ownership. This section describes the full-scale desorption process, ATP, whose operations are simulated by the bench-scale ATP equipment.

1.3.1 Description of the SoilTech ATP System

1.3.1.1 Overview

The central element of the SoilTech ATP System is the processor which resembles a rotary kiln on its exterior. However, inside the processor are three physically distinct zones and four zones of distinctly different physical processes. The four physical process zones are as follows:

1. Preheat zone
2. Reaction zone
3. Combustion zone
4. Cooling zone

Figure 1 shows a schematic cross section of the processor and depicts each of the four zones.

Low-temperature volatiles such as water and light organics are distilled in the preheat zone at temperatures of about 600°F. Oils and other heavy volatiles are distilled in the retort zone at temperatures typically in the range of 900°F to 1,150°F under anaerobic (oxygen-depleted) conditions. The anaerobic condition in the retort zone

is maintained by sand seals which allow the passage of solids and inhibit the flow of gases. The seals are located between the preheat zone and the retort zone and between the retort zone and the combustion zone. The vaporized water and organic products are removed from the processor, then condensed and separated in the vapor train equipment.

In the retort zone, some thermal cracking and coking of organic materials usually occurs, creating lighter organic gases and a coke deposit on the mineral solids. The coke is then oxidized in the combustion zone at 1,300°F to 1,400°F and thus provides part of the process's heat requirements. Part of the hot sand in the combustion zone continuously recycles back to the retort zone to provide the primary heat source for the roughly 600°F feed entering from the retort zone. The remaining sand leaving the combustion zone is cooled for discharge, heating the incoming solids or sludge in the preheat zone by thermal conduction through the annular wall. A simplified flow diagram of the entire process is illustrated on Figure 2.

1.3.1.2 Hazardous Waste Treatment

When treating hazardous wastes and sludges, the SoilTech ATP System separates the hazardous components from the inert fraction of the waste. VOCs, SVOCs, hydrocarbons in general, and significantly high-boiling-point organics [such as polynuclear aromatics (PAHs)] and heavy, halogenated hydrocarbons (such as PCBs) are removed from the solids in the preheat and retort zones. Consequently, the coked solids can be oxidized in the combustion zone without creating air emissions problems. Cleaned solids can often be backfilled or otherwise disposed of as nonhazardous waste. SoilTech's experience at two superfund sites attests to this.

1.3.1.3 Thermal Desorption

Test work and commercial Superfund remediation work conducted on PCB-contaminated sands and sludges demonstrated that solids are efficiently cleaned to very low residual levels. The PCBs removed from wastes are recovered in the condensed oil product. In a commercial project, the oil concentrate can then be managed. As an example, the oil can be shipped off-site for disposal or incineration. This was the procedure used at the Waukegan Harbor Superfund Site. This lower temperature thermal treatment gives significant advantages in process reliability and overall economics compared to wholesale incineration of oily sludges and soils.

1.3.1.4 Dehalogenation (Dechlorination)

In some cases, halogenated organic compounds such as PCBs can be totally destroyed on-site by integrating dechlorination with the ATP System. The SoilTech ATP Unit provides the heat, retention time, and mixing characteristics required to make dechlorination reactions work. The commercial cleanup performed at the Wide Beach Superfund Project indicated that over 85 percent of the PCBs entering the unit were destroyed by dechlorination in their first pass. The remaining 15 percent of the PCBs were thermally desorbed from the soil, condensed, mixed with dechlorination chemicals, then recycled to the feed end of the unit. This "recycle to extinction" technique resulted in total on-site destruction of PCBs at the Wide Beach site.

Collectively, the balance of this report provides detailed descriptions of the source/feed material, the bench-scale and full-scale equipment, the treatability test procedures and observations, the analytical test results, and the evaluation of scale-up to full-scale operations.

2.0 TREATABILITY STUDY APPROACH

2.1 Test Objectives and Rationale

The main focus of this bench-scale treatability study was to determine the ATP System's effectiveness in treating the subject materials from the ACS site. The specific objectives of this study, as defined in Canonie's proposal, were to:

1. Determine the effectiveness of the ATP System in removing VOCs, SVOCs, and PCBs from contaminated soils and wastes to remediation levels;

2. Determine TOC content of untreated and treated soils and wastes;

3. Define operational constraints and/or limitations with respect to the materials tested at this site.

2.2 Equipment and Materials

As indicated earlier, SoilTech maintains laboratory space at Hazen in Golden, Colorado for the operation of the bench-scale ATP Unit. A complete description of the equipment and materials used for bench-scale testing is included in Appendix B.

2.3 Experimental Design and Procedures

SoilTech's testing apparatus which is described in Appendix B is shown on Figure 3.

The testing sequence outlined in Canonie's proposal was followed during this treatability study and is presented in Appendix C.

Treatability testing is conducted in three test steps. Each step simulates part of the full scale ATP System and its operation, subjecting the feed sample to conditions similar to conditions in each of the process zones of the ATP System.

Ramp Test

To expose the sample to conditions as they exist in the preheat zone, the sample is first used to conduct a ramp test or variable temperature test. During this test the sample is gradually heated from ambient temperature to approximately 1,200°F. This provides some familiarity with the material to the operators and gives an indication of the temperature at which to expect contaminants and water to desorb from the sample matrix.

This test also provides some measure of safety allowing the operators to see if a violent reaction occurs at any temperature so they can plan subsequent steps to avoid any potential hazard during subsequent, quicker, and more violent retort tests. Typically no analytical samples are taken during this test as the temperatures are not indicative of full-scale operations and the products may not be representative of full scale operations.

During this test, condensate production is monitored as the formation of condensates during this test is relatively slow. To facilitate this, a graduated glass cylinder is used to collect the condensates.

The primary purpose of this test is to provide familiarity with the sample and safety to the operators.

Retort Test

After a ramp test is conducted, the sample is subjected to a retort test. This test exposes the sample to anaerobic (oxygen-starved) conditions closely approximating conditions to be experienced by the material as it passes through the anaerobic retort chamber of the full scale system.

The sample is rapidly exposed to elevated temperatures (1,000°F or 1,100°F) by feeding the sample into a preheated reactor containing an equal volume of preheated silica sand. The rapid mixing and simultaneous heating of the sample with the preheated sand simulates the recycle of sand that occurs in the retort chamber of the ATP System.

This test simulates the primary step in full-scale processing where decontamination of the matrix takes place. Samples of material, both solids and condensates, from the retort test are analyzed to determine the effectiveness of this desorption process in removing contaminants from the matrix and to characterize the condensate. Typically, the concentrations of any compounds of concern in the solids are reduced to non-detect levels in this step, signifying complete decontamination of the matrix. This test is repeated twice, once at 1,000°F and once at 1,100°F, to simulate the range of temperatures typically encountered in the full-scale system.

The material discharged from the retort test and the retort zone of the full-scale ATP System achieves 50 percent of its reduction in contaminant concentrations because

of the internal dilution caused by recycling the hot sand. This is an internal operation and the typical net effect of the ATP System is to reduce contaminant levels by more than 99 percent.

The internal recycle, the purpose of which is to provide heat transfer, does not increase the volume of soil to be treated because coarse material in the contaminated soil is typically used as the recycle sand and because it is recycled internally, not only passed through the system.

Combustion Test

Normally the products of both retort tests are combined and fed to the bench-scale system at a preheated temperature of 1,200°F. At the same time, air is circulated through the bench unit allowing the sample to be exposed to atmospheric conditions and oxygen similar to conditions in the combustion chamber of the full-scale system.

The sample, previously sampled to demonstrate complete decontamination, is allowed to combust at this higher temperature. Any coke that may have formed on the other solids present may combust at this point. In the full-scale system, this combustion provides some of the energy needed in the preheat zone. In the full-scale system, natural-gas-fired burners also provide energy to the system at this point to sustain combustion and required temperatures.

The product of the combustion test, previously demonstrated to be free of contaminants, is similar to the final product of the ATP System and can be used to characterize the discharge product for geotechnical properties. No geotechnical tests were conducted during this treatability study.

Tests Conducted

During the bench-scale testing for the ACS project, Hazen performed one ramp test (variable temperature bench test) and two retort (fixed temperature bench test) tests for each of the three source (feed) samples. One combustion test run was conducted for each of the three source samples. The combustion test used the treated solids available from the two retort test runs conducted for the respective source samples.

A summary of the observations of the three different phases of the test is provided below:

Phase I - Ramp Test

The ramp tests were conducted on each feed material. The test involved heating of the feed from ambient temperature to about 1,235°F for a residence time of up to 2.5 hours. Vapor volume and end-point temperatures of the vapors were continuously monitored to provide information for subsequent fixed-temperature (retort) tests. Products from the ramp test included coked solids and liquid condensate (oil and water).

Phase II - Retort Tests

The retort tests were conducted at low and high fixed temperatures of 1,000°F and 1,100°F. This simulates the range of temperatures present in the retort zone of the full-scale system. A residence time of 30 minutes for each retort test of the three source samples was used to provide adequate time for gases to evolve. This is normal procedure for treatability testing unless gases continue to be evolved. If a

significant quantity of gas is still evolving, the test is continued. This did not occur with these samples. The retort tests were conducted using equal amounts of pretreated silica sand. First the silica sand and the test drum were heated to desired temperatures. Once the desired temperatures were reached, the feed material was added to the drum. This sudden increase of the temperature of the sample and mixing with hot solids allows the lab procedure to simulate the desorption step in the full-scale ATP System's retort zone.

The products collected from these retort tests included coked solids (treated material) and liquid condensate.

Phase III - Combustion Test

For each source sample, one combustion test was conducted on the coked solids available from the two retort runs. The coked solids from the two retort runs were combined and, under aerobic conditions (obtained via air stream introduction in the drum), were heated to about 1,200°F. This procedure produced a representative end product which was subsequently analyzed for TOC and particle size. This procedure for the combustion test simulates the full-scale ATP treatment provided to the coked solids exiting the anaerobic/retort zone.

The only product collected from this test was combusted solids.

During all the tests, a 12-point analog recorder continuously recorded temperatures within the bench-scale unit. These data and other data including sample weights, times at which observations were made, off-gas flow rates, ATP Drum rotation rates and other factors recorded by the operator are presented in Appendix A.

2.4 Sampling and Analysis

The feed material, the treated material, and the discharged streams generated during testing were sampled and analyzed in accordance with Canonie's revised proposal dated December 23, 1992. Table 1 presents the schedule of chemical analyses. In addition to the chemical analyses presented in Table 1, the feed and coked solids were also analyzed for TRPH.

Two feed material samples, namely HRI 46532-3 [ACS-COOFF 03-01, Off-site Containment Area (spiked)] and 46532-4 [ACS-TP02A-01, On-site Containment Area (spiked)] were analyzed for VOCs, SVOCs, and PCBs by a laboratory contracted by Warzyn. All the other analyses were conducted by SoilTech through Hazen, Vista, and other laboratories. Table 2 presents the analytical methods used by SoilTech's laboratories. Appendix D presents the analytical raw data obtained from the laboratories.

Tables 3, 4, and 5 summarize the results of chemical analyses.

2.5 Data Management

Through the subcontractor laboratory, Contract Laboratory Program-type quality assurance/quality control (QA/QC) for the VOC, SVOC, and PCB analyses was provided. The QA/QC information is presented along with the raw data in Appendix D. All the other analyses were conducted in accordance with the QA/QC required by the methods cited in Table 2, the standard operating procedures, or as developed in-house through extensive bench-scale testing experience. Observations

and data were well documented through the use of logbooks and data collection sheets.

2.6 Deviations From the Proposal

One major deviation from the proposal and standard procedure was instituted during the treatability study. A solution containing some chemical contaminants was added to two of the feed samples to augment the concentration of these contaminants.

3.0 RESULTS AND DISCUSSIONS

Analytical results came primarily from two laboratories. Warzyn contracted with Environmental Monitoring and Technologies, Inc. for analysis of feed samples 46532-3 [ACS-COOFF 03-01, Off-site Containment Area (spiked)], and 46532-4 [ACS-TPO2A-01, On-site Containment Area (spiked)]. They analyzed using methods performed according to SW-846 "Test Methods for Evaluating Solid Waste." They reported using the CERCLA Target Compound List for CERCLA Sites.

SoilTech contracted with Vista Laboratories to analyze the remainder of the samples including the third feed sample 46532-2 (ACS-COOFF 02-01, Off-site Containment Area) for SVOCs and VOCs as well as the majority of other required analyses. Vista analyzed according to SW846 methods 8240 and 8270 and reported VOCs and SVOCs using the lists in these methods.

The two lists are not identical and therefore the two lists are not directly comparable. Some compounds are not on both lists and analytical results are not available. For the majority of compounds results from the two labs are comparable. Where data is not available "NA" appears in the tables to signify that this particular compound was not analyzed for, and no detection limit is specified. For this report the 8240 and 8270 formats, applicable to the majority of the analyses, have been used.

The analytical results for TRPH, oil and grease, VOCs, SVOCs, PCBs, and carbon contents are summarized in Tables 3 through 5. The results for grain-size analysis, loss on ignition, and moisture content are discussed in Hazen's report presented in Appendix A. In this section, the above-mentioned results are discussed in detail.

3.1 Feed Samples

The moisture content of the unspiked Sample HRI 46532-2 (ACS-COOFF 02-01, Off-site Containment Area) was determined to be 21.7 percent. This sample was a granular mud material with free liquid standing on top of the sample. The sample resembled thick wet concrete with several brown and white pebbles. Spiked Sample HRI 46532-3 [ACS-COOFF 03-01, Off-site Containment Area (spiked)] was determined to have a moisture content of 18.6 percent. This sample was a dark brown to black soil with some rocks up to 2 inches in diameter.

Sample 46532-4 [ACS-TP02A-01, On-site Containment Area (spiked)] was a spiked, thin, tan sludge with dark brown crystals up to two inches in diameter and some black oil streaks. The crystal broke into small flakes when the sample was homogenized. The moisture content was determined to be 29.2 percent.

Loss on ignition of the ash material for the Samples HRI 46532-2 (ACS-COOFF 02-01, Off-site Containment Area), 46532-3 [ACS-COOFF 03-01, Off-site Containment Area (spiked)] and 46532-4 [ACS-TP02A-01, On-site Containment Area (spiked)] were 1.42 percent, 2.15 percent, and 0.87 percent, respectively. These results provide a measure of the combustible material present in the feed soils.

The grain-size analysis results show that about 16 percent of the feed Samples HRI 46532-2 (ACS-COOFF 02-01, Off-site Containment Area) and 46532-3 [ACS-COOFF 03-01, Off-site Containment Area (spiked)] passes through 200 mesh, while 26 percent of the feed Sample HRI 46532-4 [ACS-TP02A-01, On-site Containment Area (spiked)] passes through 200 mesh. These results indicate the samples to be silty to clayey sands.

All the feed samples contained TRPH and oil and grease at high concentrations. The TRPH concentrations were found to be in the range of 7,700 ppm to 12,000 ppm, while oil and grease concentrations were determined to be in the range of 4,700 to 400,000 ppm (40 percent). These analyses indicate presence of light and heavy hydrocarbons at significant levels.

Those VOCs which were detected above 1,000 ppm in any sample include acetone (110 ppm to 86,600 ppm), methylene chloride (less than 25 ppm to 1,500 ppm), 1,2-dichloroethane (less than 60 ppm to 3,200 ppm), 2-butanone (91 ppm to 6,000 ppm), 1,1,1-trichloroethane (1,110 ppm to 19,700 ppm), trichloroethene (134 ppm to 3,700 ppm), tetrachloroethene (874 to 3,900 ppm), benzene (less than 41 ppm to 5,110 ppm), toluene (353 ppm to 2,200 ppm), and total xylenes (830 ppm to 3,700 ppm). The concentrations of the VOCs detected in the spiked samples were much lower than those anticipated. This discrepancy may be attributable to the complex characteristics of the feed material (i.e., the presence of both polar and non-polar compounds), to preferential partitioning of the contaminants within the complex waste matrices, or to inadequate mixing due to the heterogeneous nature of the waste material.

All the samples contained Aroclor 1248. The detected concentrations ranged from less than 6.5 ppm to 150 ppm. The unspiked Sample HRI 46532-2 (ACS-COOFF 02-01, Off-site Containment Area) contained Aroclor 1254 at a concentration of 77 ppm. As observed during the VOC analyses, the concentrations of Aroclor 1248 detected in spiked samples were lower than those anticipated. This discrepancy again may be explained by the rationale presented for analysis of VOC results.

The SVOCs detected at or above a concentration of 100 ppm included phenol (less than 2 ppm to 150 ppm; isophorone (less than 0.3 ppm to 225 ppm); naphthalene (13 ppm to 100 ppm); and bis(2-ethylhexyl)phthalate (less than 17.5 ppm to 210 ppm). Similar to the VOC and PCB results, the concentrations of the selected SVOC compounds in the spiked samples were less than anticipated.

The feed Samples HRI 46532-2 (ACS-COOFF 02-01, Off-site Containment Area), HRI46532-3 [ACS-COOFF 03-01, Off-site Containment Area (spiked)], and HRI46532-4 [ACS-TP02A-01, On-site Containment Area (spiked)] were also analyzed for TOC. The TOC concentrations were detected to be 8.45, 4.01 and 50.53 percent, respectively. The concentrations of the organic carbon and carbonate carbon for each sample are shown in Tables 3, 4 and 5.

3.2 Coked Solids

All the samples of coked solids generated by both retort runs (1,000°F and 1,100°F) were analyzed for TRPH. The results indicated that TRPH was not present in any of the samples above the detection limits. The coked solids were not analyzed for oil and grease.

The analytical results indicate that VOC and SVOC clean-up goals defined in the RFP and presented in Appendix E were met during all the test runs, or the residual concentrations were below detection limits. Table 6 presents the calculated minimum removal efficiencies.

The analytical results for Sample HRI 46532-2 (ACS-COOFF 02-01, Off-site Containment Area) indicated that all contaminants were removed to below the

remediation levels. For Samples HRI 46532-3 [ACS-COOFF 03-01, Off-site Containment Area (spiked)] and HRI46532-4 [ACS-TP02A-01, On-site Containment Area (spiked)] the analyses indicated that PCBs and all the VOCs and SVOCs were removed below their remediation limits, with the exceptions noted in Table 7. These exceptions are exceptions because the remediation level stated in the RFP is lower than the detection limit.

Canonie believes that the VOCs indicated to be present at levels below the remediation level but above the detection limit in feed materials were removed from the feed material once the feed material was heated to 1,000°F. The presence of VOCs in the retort samples is believed to reflect contamination subsequent to the retort test. The hot coked material may have adsorbed or absorbed moisture (and associated volatile contaminants) from the ambient air. At the Hazen facility, the hot coked solids are covered and put under a ventilated hood for cooling. As the spiking solution contained VOCs at high concentrations, a potential existed that the air in the same room may also contain these VOCs. When the hot coked solids were transferred to a pan and put under the hood, they may have absorbed the moisture and some VOCs from the air due to their hygroscopic nature. This suspicion of laboratory VOC contamination is supported by the absence of heavier compounds with higher boiling points in the retort samples.

Based on a knowledge of the ATP System and full-scale operational experience, Canonie and SoilTech strongly believe that no VOCs will be present in the coked solids produced by the full-scale ATP System.

When compared with the VOC remediation levels (clean-up goals) presented in Appendix E (adopted from Warzyn's RFP), the results indicate that all the coked solids met or exceeded the clean-up goals except as noted in Table 7.

Minimum removal efficiencies of 95 percent to greater than 99 percent were achieved for the VOCs. To obtain a conservative estimate, the concentrations in the two representative coked solids were compared, and the one which was the highest was used in the calculations. For those compounds which were detected in the feed sample, but not in any of the coked solids, the detection limit concentration was used during the calculation of the minimum removal efficiency.

All the SVOCs were removed from the feed material to non-detect levels or to levels below the cleanup goals presented in Appendix E, except as previously noted. The minimum removal efficiencies calculated for the SVOCs are presented in Table 6. These removal efficiencies calculated on the same basis as for VOCs. Removal efficiencies for the SVOCs were between 77 percent and 99 percent. Low removal efficiencies are attributable to the low feed sample concentrations and high detection limits for the coked solids.

The PCB clean-up goals presented in the Appendix E were met during all the test runs. No PCBs were detected in the coked solids, indicating complete desorption. The minimum removal efficiencies were calculated for Aroclor 1248 and ranged from 98 percent to 99 percent.

TOC is determined in the feed and retort solids to quantify the coke formed during desorption of the contaminants in the retort chamber. This allows SoilTech to

evaluate the use of the distilled compounds as fuel for the system and to estimate how much energy will be available from the waste during the combustion process.

By examining the initial and resultant TOC content of the material, SoilTech can estimate the amount of potential fuel savings that may be achievable with the specific waste to be treated.

SoilTech has not historically used this analysis as an indicator of the efficiency of the desorption step. The detection limit of .05% and the relative accuracy of the analysis (± 5%) is no better than specific analyses conducted to determine the initial and resultant content of specific compounds in the waste e.g., examination of VOCs, SVOCs, and PCBs.

TOC concentrations are a poor indicator of contaminant removal as they fail to provide specific information about the compounds of concern, those organic compounds that render the material a waste. For this determination, specific analyses for the compound of concern is required.

TOC data for retort solids give an indication of the quantity of nonvolatile organics that remain after exposure to retort temperatures, typically 1,000°F and 1,100°F. TOC concentration information for the combusted solids provides information about organic material that has not combusted in the presence of air at temperatures of approximately 1,200°F.

TOC was reduced from 8.45 percent in the feed Sample 46532-2 (ACS-COOFF 02-01, Off-site Containment Area) to 0.55 percent and 0.86 percent in the high and low retort tests, respectively. This was further reduced to 0.07 percent in the

combusted solids. This indicates little carbon remains after processing in the retort chamber and therefore, combustion will contribute only a small fraction of the energy required to operate the ATP System (i.e., the system will require an external fuel source and the waste itself will not contribute significantly to the energy requirements).

Similar results were obtained for Sample 46532-3 [ACS-COOFF 03-01, Off-site Containment Area (spiked)] with TOC being reduced from 4.01 percent in the feed to 0.46 and 0.73 percent in the retort solids, most of which was burned in the combustion process. This contaminated soil cannot be expected to contribute significantly to the energy requirements of the system.

With Sample 46532-4 [ACS-TP02A-01, On-site Containment Area (spiked)] there was a substantial quantity of organic carbon available in the feed material (50.53 percent). However, the majority of this potential energy source was removed from the system along with the contaminants prior to the combustion zone where the energy value could be utilized. This indicates that, as with the other two samples, no significant quantity of energy will be derived from the feed to the system.

3.3 Combusted Solids

The total carbon content of the combusted solids for all three samples was less than 0.28 percent, in the range of 0.05 percent to 0.28 percent. The organic carbon contents were detected in the range from 0.05 percent to 0.07 percent, while concentrations of carbonate carbon were detected to be in the range of less than 0.02 percent to 0.21 percent.

There is not a significant quantity of carbon to help sustain the energy requirements of the system nor is it sufficient to produce an emissions problem.

3.4 Condensate Samples

As expected, contaminants desorbed from the feed were concentrated in the condensate streams. PCBs, VOCs, and SVOCs were detected in both the water and oil phases collected as condensate streams. The full-scale ATP System is designed to separate the oil and water. The oil, which will contain the majority of the contaminants, can be sent off-site for disposal. The water can be either treated on-site or sent off-site for disposal or treatment.

4.0 ENGINEERING EVALUATION AND CONCLUSIONS

4.1 Engineering Evaluation

This section discusses the bench-scale data relative to full-scale ATP System operation. Material characteristics meriting special consideration or affecting optimum full-scale treatment are addressed in this section. Primary feed characteristics affecting full-scale treatment include:

1. Moisture content
2. Particle size
3. Hydrocarbon content
4. Material handling characteristics

These characteristics affect full-scale ATP System operation directly and/or affect the materials handling and safety requirements of the operation. Each of these four primary feed characteristics is discussed below, followed by a discussion of full-scale treated material character.

4.1.1 Moisture Content

Feed moisture content is a rate-limiting parameter affecting plant throughput and therefore the unit price of treatment. The ideal moisture content in the feed material for the full-scale ATP System is in the range of 5 to 10 percent. At much lower moisture contents, entrained dust can create problems in the vapor condensing systems. The dust can cause difficulties in maintaining correct pressure profiles in the internal zones of the condensing equipment. At moisture contents above 10 percent,

the latent heat required to distill the moisture from the feed in the preheat zone of the ATP System becomes a limiting factor, resulting in reduced feed capacity.

The feed samples from the ACS site contained up to 29.2 percent moisture, but some samples were measured at less than 20 percent moisture. Blending of lower moisture content soils with the higher moisture content soils will provide a consistent and lower moisture content feed to the ATP System and therefore will result in lower cost of operation and greater throughput. Reducing the feed rate may be required during full-scale operations if blending is not used.

4.1.2 Particle Size

The ACS soils material contains enough coarse material, as indicated in the testing, to be processed without routine co-feeding of a coarse additive. Any material larger than 2 inches would be screened out before feeding to the SoilTech ATP System.

4.1.3 Hydrocarbon Content

The feed samples contained up to 12,000 mg/kg of TRPH, and up to 40 percent of oil and grease. It may not be necessary to add a carrier oil to the raw feed for the condensing and pumping equipment to operate properly. The full-scale ATP System is routinely capable of treating materials containing up to 10 percent hydrocarbons, and therefore, soil blending and/or slower processing rates will be required during full-scale operations to reduce the feed hydrocarbon concentrations.

The low concentrations of PCBs and very high light-hydrocarbon loading on the ACS soil do not make it a potential candidate for on-site soil dechlorination.

The low quantity of humic material in the feed material combined with the very small concentration of heavy hydrocarbons present demonstrates that very little coke is likely to form on the particles in the retort zone. This is verified by the low TOC results on the coked solids. This is well within the combustion zone's capacity to burn coke completely and efficiently. The coke will provide only a small portion of the fuel requirements of the ATP System. The hydrocarbon content of this material will therefore have no impact upon processing rates in the full-scale ATP System.

4.1.4 Materials Handling Characteristics

No difficulties concerning materials handling of the ACS soils are anticipated. Material greater than 2 inches in diameter would be screened out and, if necessary, crushed and processed.

Treated soils are expected to be quite dusty. However, the soil conditioner at the discharge end of the ATP System is designed to effectively cool and moisten the final product to ensure that fugitive dust emissions are eliminated.

4.2 Conclusions

Based on the results, discussions, and engineering evaluation, Canonie and SoilTech believe that the soils and wastes represented by the treatability study samples can be effectively treated by the full-scale ATP System.

The test data indicate that the SoilTech ATP System is well suited for treating material from the ACS site. Specifically, the tests provided the following information:

1. PCBs were reduced to nondetectable levels (1000 µg/kg) in the three treated samples, half the remediation level specified in the RFP. TRPH were also reduced to nondetectable levels. (SoilTech has demonstrated at commercial-scale that the target PCB concentrations of 2000 µg/kg or less can be achieved.)

2. Concentrations of VOCs and SVOCs were reduced to non-detect levels or, if detected, to levels below the remediation levels/cleanup goals. The exceptions to this are noted in Table 7. These exceptions are where analysis indicated the compound was not present but the detection limit was above the remediation level.

3. The TOC present in the feed material was significantly reduced by the ATP System. However, some TOC was present in the treated soil, indicating the presence of carbonaceous material which was not combustible at temperatures of up to 1200°F. A more extensive discussion of TOC analysis is provided at the end of Section 3.2.

4. Liquid products of the ATP System are treatable by conventional treatment methods. The aqueous liquid product (water) generated by the treatment process can be treated in an on-site or off-site water treatment system. If treated on-site, the treated water can be used to cool and reduce dusting of the combusted material which exits the ATP System. The organic liquid product (oil) generated by the treatment process can be sent off-site for disposal.

Based on past experience with both bench-scale tests and full-scale operations, SoilTech believes bench testing is indicative of SoilTech's ability to achieve similar results at full scale to those indicated during the bench tests.

TABLES

TABLE 1

SCHEDULE OF CHEMICAL ANALYSES

	Sand	Feed	Coked Solids	Combusted Solids	Condensed Oil	Condensed Water
Number of Samples	1	3	6	3	3	3
Moisture	1	3	--	--	--	--
Oil and Grease	--	3	--	--	--	--
TOC	--	3	6	3	--	--
PCB	--	3	6	--	3	3
VOC	--	3	6	--	3	3
SVOC	--	3	6	--	3	3
Particle Size Distribution	1	3	--	3	--	--
Simulated Distillation	--	3	--	--	3	--
Dean Stark Extraction	--	3	--	--	--	--
Loss on Ignition	--	3	6	--	--	--

TABLE 2

ANALYTICAL METHODS

<u>Solids</u>	
Moisture (Feed Soil)	Gravimetric Method at 105°C for 16 hours
TOC	SW846/Method 9060
pH	EPA/SW846/Method 9045
VOCs	EPA/SW846/Method 8240
SVOCs	EPA/SW846/Method 8270
PCB	EPA/SW846/8080
Dean Stark Extraction	Proprietary Method - Similar to API 40
Simulated Distillation	ASTM D2887
Grain-Size Distribution	ASTM 422 (Sieve Analysis Only, Excludes Hydrometer Testing)
Loss on Ignition	Proprietary Gravimetric Method
<u>Condensed Oil and Water</u>	
PCB (Low Concentration)	EPA/SW846/8080
PCB (High Concentration)	Vista Lab SOP No. 325.5, Hexane extraction followed by GC/FID analysis
Simulated Distillation	ASTM D2887
VOCs	EPA/SW846/Method 8240
SVOCs	EPA/SW846/Method 8270

TABLE 3
SUMMARY OF ANALYTICAL RESULTS
FOR HRI NO. 46532-2 (Off-site Containment Area)

Hazen Sample No. 46532	18.1-2-S1	18.2-2-S2H	18.3-2-S2L	18.23-2-L1(W)	18.23-2-L1(O)	
Warzyn Sample No.	ACS-COOFF-02-01					
Vista Sample No.	935754-001	935754-002	935754-003	935754-004U	935754-004L	Remediation Level
Sample Description	Feed	High Retort Coked Solids	Low Retort Coked Solids	Water Condensate	Oil Condensate	(RFQ Table 1)
Units	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
TRPH	1.2E7	ND (40,000)	ND(40,000)	NA	NA	
Oil and Grease	1.2E7	NA	NA	NA	NA	
VOCs						
Chloromethane	ND (200,000)	14	11	ND (1,000,000)	ND (1,000,000)	
Methylene Chloride	1,500,000	190	290	16,000,000	810,000	6,200
Acetone	110,000 J	4,400	190	910,000 J	1,300,000 J	2,400,000
Carbon Disulfide	ND (100,000)	12	18	ND (500,000)	ND (500,000)	
1,1 Dichloroethene	30,000 J	ND (5)	6.4	710,000	290,000	98
1,1 Dichloroethane	100,000	8.1	ND (5)	1,400,000	120,000 J	
1,2 Dichloroethenes, Total	ND (100,000)	ND (5)	3.5 J	140,000 J	120,000 J	250,000
Chloroform	43,000 J	3.4 J	3.6 J	ND (500,000)	150,000 J	9,500
1,2 Dichloroethane	3,200,000	47	8.4	67,000,000	1,700,000	640
2-Butanone (MEK)	560,000 J	3.2 J	ND (100)	3,600,000 J	3,300,000 J	620,000
1,1,1-Trichloroethane	1,300,000	130	44	8,000,000	10,000,000	2,300,000
Bromodichloromethane	ND (100,000)	ND (5)	ND (5)	ND (5)	160,000 J	
1,2-Dichloropropane	27,000 J	ND (5)	ND (5)	ND (500,000)	190,000 J	420
Trans-1,3-Dichloropropene	25,000 J	7.5	ND (5)	ND (500,000)	180,000 J	
Trichloroethene	3,700,000	36	30	95,000,000	1,200,000	5,300
Dibromochloromethane	28,000 J	ND (5)	ND (5)	ND (500,000)	160,000 J	
1,1,2-Trichloroethane	ND (100,000)	ND (5)	ND (5)	ND (500,000)	220,000 J	510
Benzene	490,000	23	23	10,000,000	640,000	1,000
Cis-1,3-Dichloropropene	22,000 J	ND (5)	ND (5)	ND (500,000)	170,000 J	
2-Chloroethylvinylether	ND (200,000)	ND (10)	ND (10)	ND (1,000,000)	170,000 J	
Bromoform	28,000 J	ND (5)	ND (5)	ND (500,000)	130,000 J	
4-Methyl-2-Pentanone (MIK)	ND (1,000,000)	ND (50)	ND (50)	11,000,000	1,000,000 J	630,000
Tetrachloroethene	1,400,000	37	48	26,000,000	670,000	1,100
1,1,2,2-Tetrachloroethane	ND (100,000)	ND (5)	ND (5)	ND (500,000)	360,000 J	280
Toluene	2,200,000	36	34	54,000,000	1,300,000	5,000,000
Chlorobenzene	67,000 J	30	26	ND (500,000)	ND (500,000)	150,000
Ethylbenzene	870,000	24	27	18,000,000	720,000	1,300,000
Styrene	420,000	9	14	11,000,000	550,000	1,700
Xylenes Total	3,700,000	18	ND (5)	87,000,000	1,900,000	2.6E7

TABLE 3 (Continued)
SUMMARY OF ANALYTICAL RESULTS
FOR HRI NO. 46532-2 (Off-site Containment Area)

Hazen Sample No. 46532 Warzyn Sample No. Vista Sample No.	18.1-2-S1 ACS-COOFF-02-01 935754-001	18.2-2-S2H 935754-002	18.3-2-S2L 935754-003	18.23-2-L1(W) 935754-004U	18.23-2-L1(O) 935754-004L	Remediation Level
Sample Description Units	Feed ug/Kg	High Retort Coked Solids ug/Kg	Low Retort Coked Solids ug/Kg	Water Condensate ug/Kg	Oil Condensate ug/Kg	(RFQ Table 1) ug/Kg
PCBs						
Aroclor 1248	ND (6,500)	ND (1,000)	ND (1,000)	3,700,000	ND (1,000)	2,000
Aroclor 1254	77,000	ND (1,000)	ND (1,000)	1,200,000	ND (1,000)	2,000
SVOCs						
Phenol	150,000	ND (330)	ND (330)	7,800,000	1,300,000	
Benzyl Alcohol	ND (66,000)	ND (660)	ND (660)	ND (200,000)	68,000 J	
1,2-Dichlorobenzene	ND (33,000)	ND (330)	ND (330)	200,000	ND (100,000)	
2-Methylphenol	10,000 J	ND (330)	ND (330)	1,400,000	36,000 J	
4-Methylphenol	21,000 J	ND (330)	ND (330)	1,000,000	33,000 J	
Isophorone	150,000	ND (330)	ND (330)	3,300,000	27,000 J	7,200
2,4-dimethylphenol	10,000 J	ND (330)	ND (330)	1,100,000	ND (100,000)	
Benzoic Acid	ND (170,000)	ND (1,700)	ND (1,700)	4,000,000	170,000 J	
Naphthalene	100,000	ND (330)	ND (330)	5,200,000	ND (100,000)	82,000
4-Chloroanilene	ND (66,000)	ND (660)	ND (660)	1,600,000	ND (200,000)	
Hexachlorobutadiene	17,000 J	ND (330)	ND (330)	1,300,000	ND (100,000)	360
2-Methylnaphthaline	64,000	ND (330)	ND (330)	1,800,000	ND (100,000)	
Hexachlorocyclopentadiene	ND (33,000)	ND (330)	ND (330)	1,400,000	ND (100,000)	
Dimethyl Phthalate	12,000 J	ND (330)	ND (330)	180,000	ND (100,000)	
Acenaphthene	ND (33,000)	ND (330)	ND (330)	80,000 J	ND (100,000)	
Dibenzofuran	ND (33,000)	ND (330)	ND (330)	49,000 J	ND (100,000)	
Diethyl Phthalate	6,600	ND (330)	ND (330)	ND (100,000)	ND (100,000)	
Fluo ene	ND (33,000)	ND (330)	ND (330)	120,000	ND (100,000)	
Hexachlorobenzene	ND (33,000)	ND (330)	ND (330)	67,000 J	ND (100,000)	18
Phenanthrene	3,300 J	ND (330)	ND (330)	150,000	ND (100,000)	
Anthracene	ND (33,000)	ND (330)	ND (330)	52,000 J	ND (100,000)	

TABLE 3 (Continued)
SUMMARY OF ANALYTICAL RESULTS
FOR HRI NO. 46532-2 (Off-site Containment Area)

Hazen Sample No. 46532	18.1-2-S1	18.2-2-S2H	18.3-2-S2L	18.23-2-L1(W)	18.23-2-L1(O)	18.23-2S3	
Warzyn Sample No.	ACS-COOFF-02-01						Remediation Level
Vista Sample No.	935754-001	935754-002	935754-003	935754-004U	935754-004L		
Sample Description	Feed	High Retort Coked Solids	Low Retort Coked Solids	Water Condensate	Oil Condensate	Combusted Solids	(RFQ Table 1)
Units	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg		ug/Kg
Di-n-butyl Phthalate	71,000	ND (330)	ND (330)	570,000	ND (100,000)	NA	2,300,000
Pyrene	ND (33,000)	ND (330)	ND (330)	44,000 J	ND (100,000)	NA	
Butylbenzyl Phthalate	51,000	ND (330)	ND (330)	240,000	ND (100,000)	NA	
Benzo(a)anthracene	ND (33,000)	ND (330)	ND (330)	18,000 J	ND (100,000)	NA	
Bis (2-ethylhexyl) Phthalate	210,000	ND (330)	ND (330)	1,100,000	ND (100,000)	NA	1,100
Chrysene	ND (33,000)	ND (330)	ND (330)	22,000 J	ND (100,000)	NA	
Di-n-octyl Phthalate	ND (33,000)	ND (330)	ND (330)	16,000 J	ND (100,000)	NA	
Benzo (b) fluoranthene	ND (33,000)	ND (330)	ND (330)	17,000 J	ND (100,000)	NA	
Carbonate C	.48%	.02%	.02%	NA	NA	.21%	
Total Carbon	8.93%	.57%	.88%	NA	NA	.28%	
Organic Carbon	8.45%	.55%	.86%	NA	NA	.07%	
Simulated Distillation	COMPLETED				COMPLETED		
Loss on Ignition (LOI)	1.42%	2.08%	1.79%				
Moisture	21.7%						

ND = Not detected; reporting limit in parenthesis.

J = Detected below reporting limit; quantitation may be unreliable.

TABLE 4
SUMMARY OF ANALYTICAL RESULTS
FOR HRI NO. 46532-3 (Off-site Containment Area (spiked))

Hazen Sample No. 46532 Warzyn Sample No. Vista Sample No.	18.5-3S-S1 ACS-COOFF-03-01 935805-001	18.6-3S-S2H 935805-003	18.7-3S-S2L 935805-004	18.67-3S-L1(W) 935805-007L	18.67-3S-L1(O) 935805-007U	Remediation Level
Sample Description	Feed	High Retort Coked Solids	Low Retort Coked Solids	Water Condensate	Oil Condensate	(RFQ Table 1) (1)
Units	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
TRPH	7,700,000	ND (40,000)	ND (40,000)	NA	NA	
Oil and Grease	4,700,000	NA	NA	NA	NA	
VOCs						
Chloromethane	ND (25,000)	ND (1,000)	ND (1,000)	*NOTE: VOC Analyses is reported for the oil condensate but the sample is a composite of the oil and the water.	ND (5,000,000)	
Methylene Chloride	ND (25,000)	120 J	100 J		11,000,000	6,200
Acetone	113,000	5,400 J	1,200 J		800,000,000	2,400,000
Carbon Disulfide	ND (100,000)	ND (500)	170 J		ND (2,500,000)	
1,1 Dichloroethene	103,000	ND (500)	ND (500)		1,500,000 J	98
1,1 Dichloroethane	ND (25,000)	ND (500)	ND (500)		4,700,000	
1,2 Dichloroethenes, Total	NA	ND (500)	ND (500)		ND (2,500,000)	250,000
Chloroform	ND (25,000)	ND (500)	ND (500)		ND (2,500,000)	9,500
1,2 Dichloroethane	202,000	ND (500)	ND (500)		30,000,000	640
2-Butanone (MEK)	91,400	140 J	ND (10,000)		390,000,000	620,000
1,1,1-Trichloroethane	1,110,000	350 J	ND (500)		12,000,000	2,300,000
1,2-Dichloropropane	ND (25,000)	ND (500)	ND (500)		ND (2,500,000)	420
Trans-1,3-Dichloropropene	ND (25,000)	ND (500)	ND (500)		ND (2,500,000)	
Trichloroethene	378,000	ND (500)	ND (500)		7,000,000	5,300
Dibromochloromethane	ND (25,000)	ND (500)	ND (500)		ND (2,500,000)	
Benzene	ND (40,500)	ND (500)	ND (500)		21,000,000	1,000
Cis-1,3-Dichloropropene	ND (25,000)	ND (500)	ND (500)		ND (2,500,000)	
Bromoform	ND (25,000)	ND (500)	ND (500)		ND (2,500,000)	
4-Methyl-2-Pentanone (MIK)	ND (100,000)	ND (5,000)	ND (5,000)		8,500,000 J	63,000
Tetrachloroethene	874,000	ND (500)	ND (500)		7,200,000	1,100
Toluene	783,000	120 J	ND (500)		5,400,000	5,000,000
Chlorobenzene	ND (25,000)	ND (500)	ND (500)		ND (2,500,000)	150,000
Ethylbenzene	146,000	ND (500)	ND (500)		950,000 J	1,300,000
Styrene	ND (100,000)	ND (500)	ND (500)		1,700,000 J	1,700
Xylenes Total	830,000	ND (500)	ND (500)		5,600,000	2.6E7

TABLE 4 (Continued)
SUMMARY OF ANALYTICAL RESULTS
FOR HRI NO. 46532-3 (Off-site Containment Area [spiked])

Hazen Sample No. 46532 Warzyn Sample No. Vista Sample No.	18.5-3S-S1 ACS-COOFF-03-01 935805-001	18.6-3S-S2H 935805-003	18.7-3S-S2L 935805-004	18.67-3S-L1(W) 935805-007L	18.67-3S-L1(O) 935805-007U	Remediation Level
Sample Description Units	Feed ug/Kg	High Retort Coked Solids ug/Kg	Low Retort Coked Solids ug/Kg	Water Condensate ug/Kg	Oil Condensate ug/Kg	(RFQ Table 1) (1) ug/Kg
PCBs						
Aroclor 1248	150,000	ND (1,000)	ND (1,000)	69,000	2,500,000	2,000
Aroclor 1254	NA	ND (1,000)	ND (1,000)	ND (10,000)	ND (100,000)	2,000
SVOCs						
Phenol	15,400	ND (1,650)	ND (1,650)	740,000	1,600,000	
Bis (2-chloroethyl)ether	ND (500)	ND (1,650)	ND (1,650)	41,000 J	430,000	
Benzyl Alcohol	NA	ND (3,300)	ND (3,300)	83,000 J	530,000 J	
1,2-Dichlorobenzene	ND (900)	ND (1,650)	ND (1,650)	ND (100,000)	170,000	
Bis(2-chloroisopropyl)ether	25,000	ND (10,000)	ND (10,000)		ND (10,000)	
2-Methylphenol	NA	ND (1,650)	ND (1,650)	41,000 J	360,000	
4-Methylphenol	NA	ND (1,650)	ND (1,650)	87,000 J	480,000	
Isophorone	ND (300)	ND (1,650)	ND (1,650)	31,000 J	830,000	7,200
2-Nitrophenol	ND (1,800)	ND (1,650)	ND (1,650)	ND (100,000)	780,000	
2,4-dimethylphenol	ND (16,700)	ND (1,650)	ND (1,650)	ND (100,000)	ND (100,000)	
Benzoic Acid	NA	ND (8,500)	ND (8,500)	450,000	1,900,000 J	
Naphthalene	45,800	ND (1,650)	ND (1,650)	17,000J	1,300,000	82,000
4-Chloroanilene	NA	ND (3,300)	ND (3,300)	ND (200,000)	ND (200,000)	
Hexachlorobutadiene	ND (500)	ND (1,650)	ND (1,650)	ND (100,000)	ND (100,000)	360
2-Methylnaphthalene	NA	ND (1,650)	ND (1,650)	ND (100,000)	840,000	
Hexachlorocyclopentadiene	ND (9,500)	ND (1,650)	ND (1,650)	ND (100,000)	ND (100,000)	
Dimethyl Phthalate	ND (700)	ND (1,650)	ND (1,650)	ND (100,000)	69,000 J	
Acenaphthene	1,040	ND (1,650)	ND (1,650)	ND (100,000)	ND (100,000)	
Acenaphthylene	ND (130)	ND (1,650)	ND (1,650)	ND (100,000)	23,000 J	
Dibenzofuran	NA	ND (1,650)	ND (1,650)	ND (100,000)	ND (100,000)	
Diethyl Phthalate	ND (1,000)	ND (1,650)	ND (1,650)	ND (100,000)	ND (100,000)	
Fluorene	ND (130)	ND (1,650)	ND (1,650)	ND (100,000)	36,000 J	
Hexachlorobenzene	ND (1,900)	ND (1,650)	ND (1,650)	ND (100,000)	ND (100,000)	18
Phenanthrene	1,260	ND (1,650)	ND (1,650)	ND (100,000)	44,000 J	

TABLE 4 (Continued)
SUMMARY OF ANALYTICAL RESULTS
FOR HRI NO. 46532-3 (Off-site Containment Area [spiked])

Hazen Sample No. 46532	18.5-3S-S1	18.6-3S-S2H	18.7-3S-S2L	18.67-3S-L1(W)	18.67-3S-L1(O)	18.67-3S-S3	
Warzyn Sample No.	ACS-COOFF-03-01						Remediation Level
Vista Sample No.	935805-001	935805-003	935805-004	935805-007L	935805-007U		
Sample Description	Feed	High Retort Coked Solids	Low Retort Coked Solids	Water Condensate	Oil Condensate	Combusted Solids	(RFQ Table 1) (1)
Units	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg		ug/Kg
Anthracene	ND (130)	ND (1,650)	ND (1,650)	ND (100,000)	14,000 J	NA	
Di-n-butyl Phthalate	33,700	ND (1,650)	ND (1,650)	ND (100,000)	290,000	NA	2,300,000
Pyrene	ND (130)	ND (1,650)	ND (1,650)	ND (100,000)	14,000 J	NA	
Butylbenzyl Phthalate	9,400	ND (1,650)	ND (1,650)	ND (100,000)	49,000 J	NA	
Benzo(a)anthracene	ND (130)	ND (1,650)	ND (1,650)	ND (100,000)	ND (100,000)	NA	
Bis (2-ethylhexyl) Phthalate	162,000	ND (1,650)	ND (1,650)	29,000 J	1,300,000	NA	1,100
Chrysene	7,250	ND (1,650)	ND (1,650)	ND (100,000)	120,000	NA	
Di-n-octyl Phthalate	<4,700	ND (1,650)	ND (1,650)	ND (100,000)	11,000 J	NA	
Benzo (b) fluoranthene	<130	ND (1,650)	ND (1,650)	ND (100,000)	ND (100,000)	NA	
Diphenyl ether	70,500	ND (10,000)	ND (10,000)		ND (10,000)	NA	
Cresols	29,100	ND (10,000)	ND (10,000)		ND (10,000)	NA	
Carbonate C (%)	.56	.07	.06	NA	NA	.20%	
Total Carbon	4.57	.53	.79	NA	NA	.26%	
Organic C	4.01	.46	.73	NA	NA	.06%	
Simulated Distillation	COMPLETED				COMPLETED		
Loss on Ignition (LOI)	2.1%	1.33%	1.70%				
Moisture	18.6%						

(1) The sum of Method 8240 analytes exceed 100%. The method is designed for trace analysis with an original detection limit, before dilutions of 5 ug/kg. A certain level of error is inherent to each serial dilution. Several dilutions were required to analyze the high concentrations of any compounds present in the sample.

ND = Not detected; reporting limit in parenthesis.

J = Detected below reporting limit; quantitation may be unreliable.

TABLE 5
SUMMARY OF ANALYTICAL RESULTS
FOR HRI NO. 46532-4 (On-site Containment Area (spiked))

Hazen Sample No. 46532 Warzyn Sample No. Vista Sample No.	18.8-4S-S1 ACS-TP02A-01 935805-002	18.9-4S-S2H 935805-005	18.10-4S-S2L 935805-006	18.910-4S-L1(W) 935805-008L	18.910-4S-L1(O) 935805-008U	Remediation Level
Sample Description Units	Feed ug/Kg	High Retort Coked Solids ug/Kg	Low Retort Coked Solids ug/Kg	Water Condensate ug/Kg	Oil Condensate ug/Kg	(RFQ Table 1) ug/Kg
TRPH	29,000,000	ND (40,000)	ND (40,000)	NA	NA	
Oil and Grease	400,000,000	NA	NA	NA	NA	
VOCs						
Chloromethane	6,340,000	ND (1,000)	ND (1,000)	ND (5,000,000)	ND (5,000,000)	
Bromomethane	5,400,000	ND (300,000)	ND (300,000)		ND (10,000)	
Chloroethane	ND (60,000)	110 J	ND (1,000)	ND (5,000,000)	ND (5,000,000)	
Methylene Chloride	ND (60,000)	ND (500)	ND (500)	ND (2,500,000)	ND (2,500,000)	6,200
Acetone	86,600,000	1,800 J	580 J	16,000,000 J	32,000,000 J	2,400,000
Carbon Disulfide	ND (240,000)	ND (500)	ND (500)	ND (2,500,000)	ND (2,500,000)	
1,1 Dichloroethene	ND (60,000)	ND (500)	140 J	700,000 J	ND (2,500,000)	98
1,1 Dichloroethane	ND (60,000)	ND (500)	ND (500)	ND (2,500,000)	ND (2,500,000)	
1,2 Dichloroethenes, Total	NA	ND (500)	ND (500)	ND (2,500,000)	ND (2,500,000)	250,000
Chloroform	ND (60,000)	ND (500)	ND (500)	ND (2,500,000)	ND (2,500,000)	9,500
1,2 Dichloroethane	ND (60,000)	ND (500)	ND (500)	ND (2,500,000)	ND (2,500,000)	640
2-Butanone (MEK)	6,000,000	ND (10,000)	ND (10,000)	ND (50,000,000)	ND (50,000,000)	620,000
1,1,1-Trichloroethane	19,700,000	220 J	8,700	11,000,000	19,000,000	2,300,000
1,2-Dichloropropane	ND (60,000)	ND (500)	ND (500)	ND (2,500,000)	ND (2,500,000)	
Trans-1,3-Dichloropropene	ND (60,000)	ND (500)	ND (500)	ND (2,500,000)	ND (2,500,000)	
Trichloroethene	134,000	ND (500)	ND (500)	ND (2,500,000)	ND (2,500,000)	5,300
Dibromochloromethane	ND (60,000)	ND (500)	ND (500)	ND (2,500,000)	ND (2,500,000)	
Benzene	5,110,000	ND (500)	ND (500)	9,500,000	ND (2,500,000)	1,000
Cis-1,3-Dichloropropene	ND (60,000)	ND (500)	ND (500)	ND (2,500,000)	ND (2,500,000)	
Bromoform	ND (120,000)	ND (500)	ND (500)	ND (2,500,000)	ND (2,500,000)	
4-Methyl-2-Pentanone (MIK)	ND (240,000)	ND (5,000)	ND (5,000)	ND (25,000,000)	ND (25,000,000)	630,000
Tetrachloroethene	3,900,000	ND (500)	ND (500)	6,700,000	ND (2,500,000)	1,100
Toluene	353,000	ND (500)	ND (500)	1,400,000	ND (2,500,000)	5,000,000
Chlorobenzene	ND (60,000)	ND (500)	ND (500)	ND (2,500,000)	ND (2,500,000)	150,000
Ethylbenzene	159,000	ND (500)	ND (500)	ND (2,500,000)	ND (2,500,000)	1,300,000
Styrene	ND (240,000)	ND (500)	ND (500)	ND (2,500,000)	ND (2,500,000)	1,700
Xylenes Total	1,960,000	ND (500)	ND (500)	3,300,000	ND (2,500,000)	2.6E7

TABLE 5 (Continued)
SUMMARY OF ANALYTICAL RESULTS
FOR HRI NO. 46532-4 (On-site Containment Area [spiked])

Hazen Sample No. 46532	18.8-4S-S1	18.9-4S-S2H	18.10-4S-S2L	18.910-4S-L1(W)	18.910-4S-L1(O)	
Warzyn Sample No.	ACS-TP02A-01					Remediation
Vista Sample No.	935805-002	935805-005	935805-006	935805-008L	935805-008U	Level
Sample Description	(a) Feed	High Retort Coked Solids	Low Retort Coked Solids	Water Condensate	Oil Condensate	(RFQ Table 1)
Units	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
PCBs						
Arochlor 1248	72,300	ND (1,000)	ND (1,000)	830,000	ND (1,000)	2,000
Arochlor 1254	NA	ND (1,000)	ND (1,000)	ND (100,000)	ND (1,000)	2,000
SVOCs						
Phenol	ND (2,000)	ND (330)	ND (330)	1,600,000	290,000	
Benzyl Alcohol	NA	ND (660)	ND (660)	ND (200,000)	ND (200,000)	
1,2-Dichlorobenzene	ND (4,500)	ND (330)	ND (330)	ND (100,000)	ND(100,000)	
2-Methylphenol	NA	ND (330)	ND (330)	ND (100,000)	ND(100,000)	
4-Methylphenol	NA	ND (330)	ND (330)	ND (100,000)	ND(100,000)	
Isophorone	225,000	ND (330)	ND (330)	4,300,000	140,000	7,200
2,4-dimethylphenol	ND (2,300)	ND (330)	ND (330)	ND (100,000)	ND (100,000)	
Benzoic Acid	NA	ND (1,700)	ND (1,700)	360,000 J	ND (500,000)	
Naphthalene	13,000	ND (330)	ND (330)	850,000	ND (100,000)	82,000
4-Chloroanilene	ND (2,500)	ND (660)	ND (660)	ND (200,000)	ND (200,000)	
Hexachlorobutadiene	ND (2,500)	ND (330)	ND (330)	ND (100,000)	ND (100,000)	360
2-Methylnaphthalene	NA	ND (330)	ND (330)	210,000	ND (100,000)	
Hexachlorocyclopentadiene	ND (47,500)	ND (330)	ND (330)	ND (100,000)	ND (100,000)	
2-Chloronapthalene	ND (1,500)	ND (330)	ND (330)	50,000 J	ND (100,000)	
Dimethy Phthalate	ND (3,500)	ND (330)	ND (330)	ND (100,000)	ND (100,000)	
Acenaphthene	ND (650)	ND (330)	ND (330)	120,000	ND (100,000)	
Acenapthylene	ND (650)	ND (330)	ND (330)	ND (100,000)	ND (100,000)	
Dibenzofuran	NA	ND (330)	ND (330)	770,000	ND (100,000)	
Diethyl Pthalate	ND (5,000)	ND (330)	ND (330)	ND (100,000)	ND (100,000)	
Fluorene	ND (650)	ND (330)	ND (330)	110,000	ND (100,000)	
Hexachlorobenzene	ND (9,500)	ND (330)	ND (330)	ND (100,000)	ND (100,000)	18
Phenanthrene	ND (650)	ND (330)	ND (330)	130,000	ND (100,000)	
Anthracene	ND (650)	ND (330)	ND (330)	65,000 J	ND (100,000)	
Di-n-butyl Phthalate	ND (2,500)	ND (330)	ND (330)	ND (100,000)	ND (100,000)	2,300,000
Fluoranthene	ND (650)	ND (330)	ND (330)	90,000 J	ND (100,000)	

TABLE 5 (Continued)
SUMMARY OF ANALYTICAL RESULTS
FOR HRI NO. 46532-4 (On-site Containment Area [spiked])

Hazen Sample No. 46532 Warzyn Sample No. Vista Sample No. Sample Description Units	18.8-4S-S1 ACS-TP02A-01 935805-002 (a) Feed ug/Kg	18.9-4S-S2H 935805-005 High Retort Coked Solids ug/Kg	18.10-4S-S2L 935805-006 Low Retort Coked Solids ug/Kg	18.910-4S-L1(W) 935805-008L Water Condensate ug/Kg	18.910-4S-L1(O) 935805-008U Oil Condensate ug/Kg	18.23-2-S3 Combusted Solids	Remediation Level (RFQ Table 1) ug/Kg
Pyrene	ND (650)	ND (330)	ND (330)	49,000 J	ND (100,000)	NA	
Butylbenzyl Phthalate	ND (950)	ND (330)	ND (330)	ND (100,000)	ND (100,000)	NA	
Benzo(a)anthracene	ND (650)	ND (330)	ND (330)	23,000 J	ND (100,000)	NA	
Bis (2-ethylhexyl) Phthalate	ND (17,500)	ND (330)	ND (330)	2,200,000	ND (100,000)	NA	1,100
Chrysene	ND (650)	ND (330)	ND (330)	32,000 J	ND (100,000)	NA	
Di-n-octyl Phthalate	ND (23,500)	ND (330)	ND (330)	ND (100,000)	ND (100,000)	NA	
Benzo (b) fluoranthene	ND (650)	ND (330)	ND (330)	14,000 J	ND (100,000)	NA	
Diphenyl ether	4.75E7	ND (25,000)	ND (25,000)		ND (25,000)	NA	
Carbonate C (%)	<.02	<.02	<.02	NA	NA	<0.02	
Total Carbon (%)	50.53	0.76	0.77	NA	NA	.05	
Organic C (%)	50.53	0.76	0.77	NA	NA	.05	
Simulated Distillation	COMPLETED				COMPLETED		
Loss on Ignition (LOI) (%)	.87	.50	1.43				
Moisture	29.2						

(a) The feed sample consisted of a solid and a liquid phase. The analytical results shown are for the solid phase.

ND = Not detected; reporting limit in parenthesis.

J = Detected below reporting limit; quantitation may be unreliable.

TABLE 6
MINIMUM REMOVAL EFFICIENCIES
FOR VOCs, SVOCs, AND PCBs

Sample No. / Compound	Minimum % Removal HRI 46532-2	Minimum % Removal HRI 46532-3	Minimum % Removal HRI 46532-4
VOCs			
Chloromethane	NA	NA	>99.9
Methylene Chloride	>99.9	NA	NA
Acetone	96.0	95.2	>99.9
Carbon Disulfide	NA	NA	NA
1,1 Dichloroethene	>99.9	99.5	NA
1,1 Dichloroethane	>99.9	NA	NA
1,2 Dichloroethenes, Total	NA	NA	NA
Chloroform	>99.9	NA	NA
1,2 Dichloroethane	>99.9	99.8	NA
2-Butanone	>99.9	99.8	99.8
1,1,1-Trichloroethane	NA	>99.9	>99.9
1,2-Dichloropropane	>99.9	NA	NA
Trans-1,3-Dichloropropene	>99.9	NA	NA
Trichloroethene	>99.9	>99.9	99.6
Dibromochloromethane	>99.9	NA	NA
Benzene	>99.9	NA	>99.9
Cis-1,3-Dichloropropene	>99.9	NA	NA
Bromoform	>99.9	NA	NA
Tetrachloroethene	>99.9	>99.9	>99.9
Toluene	>99.9	>99.9	99.9
Chlorobenzene	>99.9	NA	NA
Ethylbenzene	>99.9	NA	99.7
Styrene	>99.9	NA	NA
Xylenes Total	>99.9	>99.9	>99.9

TABLE 6 (Continued)
MINIMUM REMOVAL EFFICIENCIES
FOR VOCs, SVOCs, AND PCBs

Sample No. / Compound	Minimum % Removal HRI 46532-2	Minimum % Removal HRI 46532-3	Minimum % Removal HRI 46532-4
PCBs			
Aroclor 1248	NA	99.3	98.6
Aroclor 1254	98.7	NA	NA
SVOCs			
Phenol	99.8	89.3	NA
2-Methylphenol	96.7	NA	NA
4-Methylphenol	98.4	NA	NA
Isophorone	99.8	NA	99.9
2,4-dimethylphenol	96.7	NA	NA
Naphthalene	99.7	96.4	97.5
Hexachlorobutadiene	98.1	NA	NA
2-Methylnaphthaline	99.5	NA	NA
Dimethy Phthalate	97.3	NA	NA
Diethyl Phthalate	95.0	NA	NA
Phenanthrene	90.0	NA	NA
Di-n-butyl Phthalate	99.5	95.1	NA
Butylbenzyl Phthalate	99.4	82.4	NA
Bis (2-ethylhexyl) Phthalate	99.8	99.0	NA
Chrysene	NA	77.2	NA

TABLE 7
COMPOUNDS NOT DETECTED WITH THE DETECTION LIMIT ABOVE THE REMEDIATION LEVEL

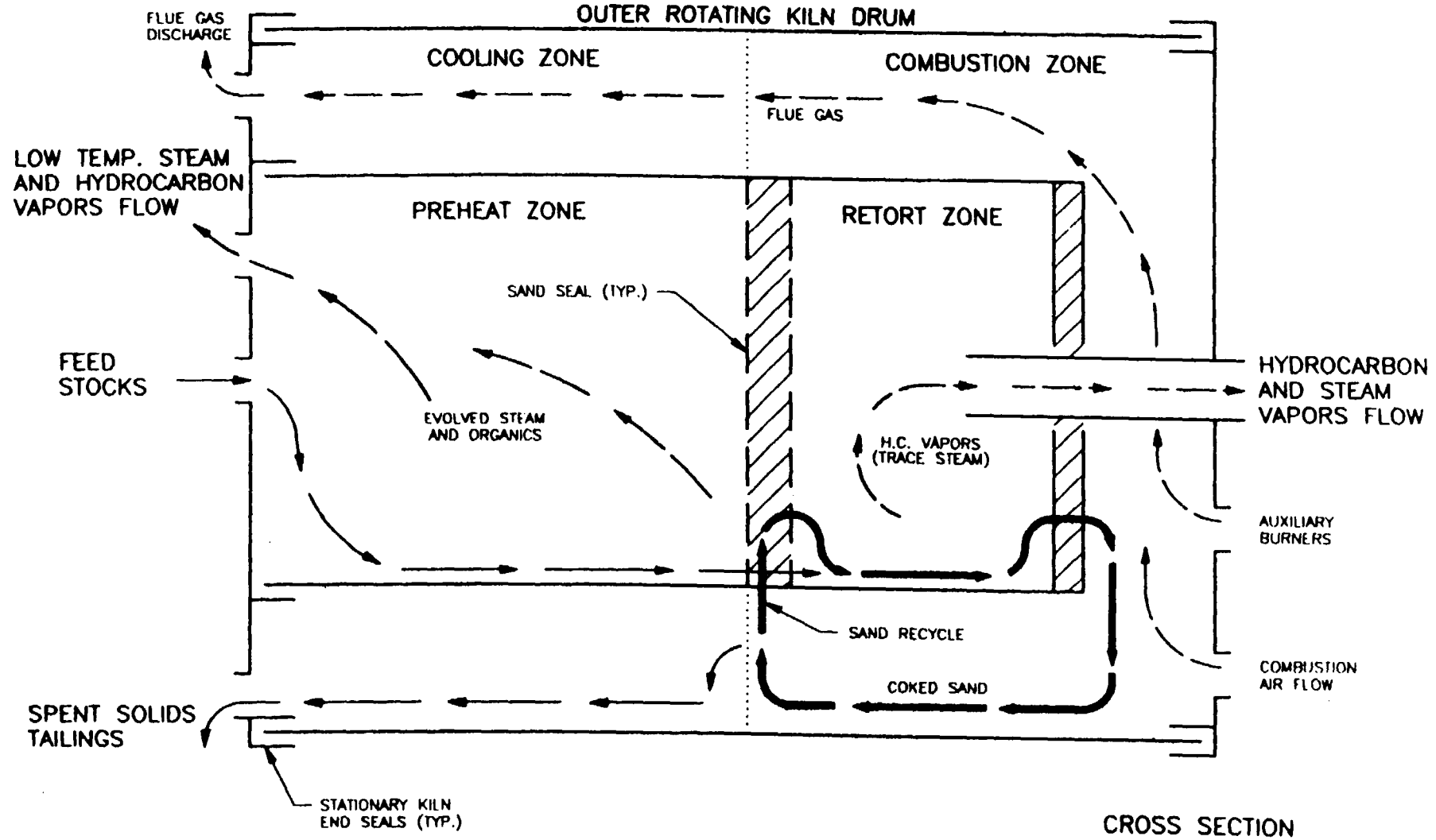
Hazen Sample No. 46532 Sample Description Units	18.6 High Retort Coked Solids ug/Kg	18.7 Low Retort Coked Solids ug/Kg	18.9 High Retort Coked Solids ug/Kg	18.10 Low Retort Coked Solids ug/Kg	Remediation Level (RFQ Table 1) ug/Kg
1,1 Dichloroethene	ND (500)	ND (500)	ND (500)	140J	98
1,2-Dichloropropane	ND (500)	ND (500)			420
Hexachlorobutadiene	ND (1,650)	ND (1,650)			360
Hexachlorobenzene	ND (1,650)	ND (1,650)	ND (330)	ND (330)	18
Bis (2-ethylhexyl) Phthalate	ND (1,650)	ND (1,650)			1,100

J = Estimated value below the detection limit.

ND = Not detected; reporting limit in parenthesis.

FIGURES

DRAWING NUMBER 92-530-A1



CROSS SECTION
SOILTECH ATP SYSTEM
GRIFFITH, INDIANA

PREPARED FOR

WARZYN, INC.

No.	DATE	ISSUE / REVISION	DWN. BY	CK'D BY	AP'D BY
1	12-14-92	ISSUED FOR PROPOSAL	SAK	CT	SRS

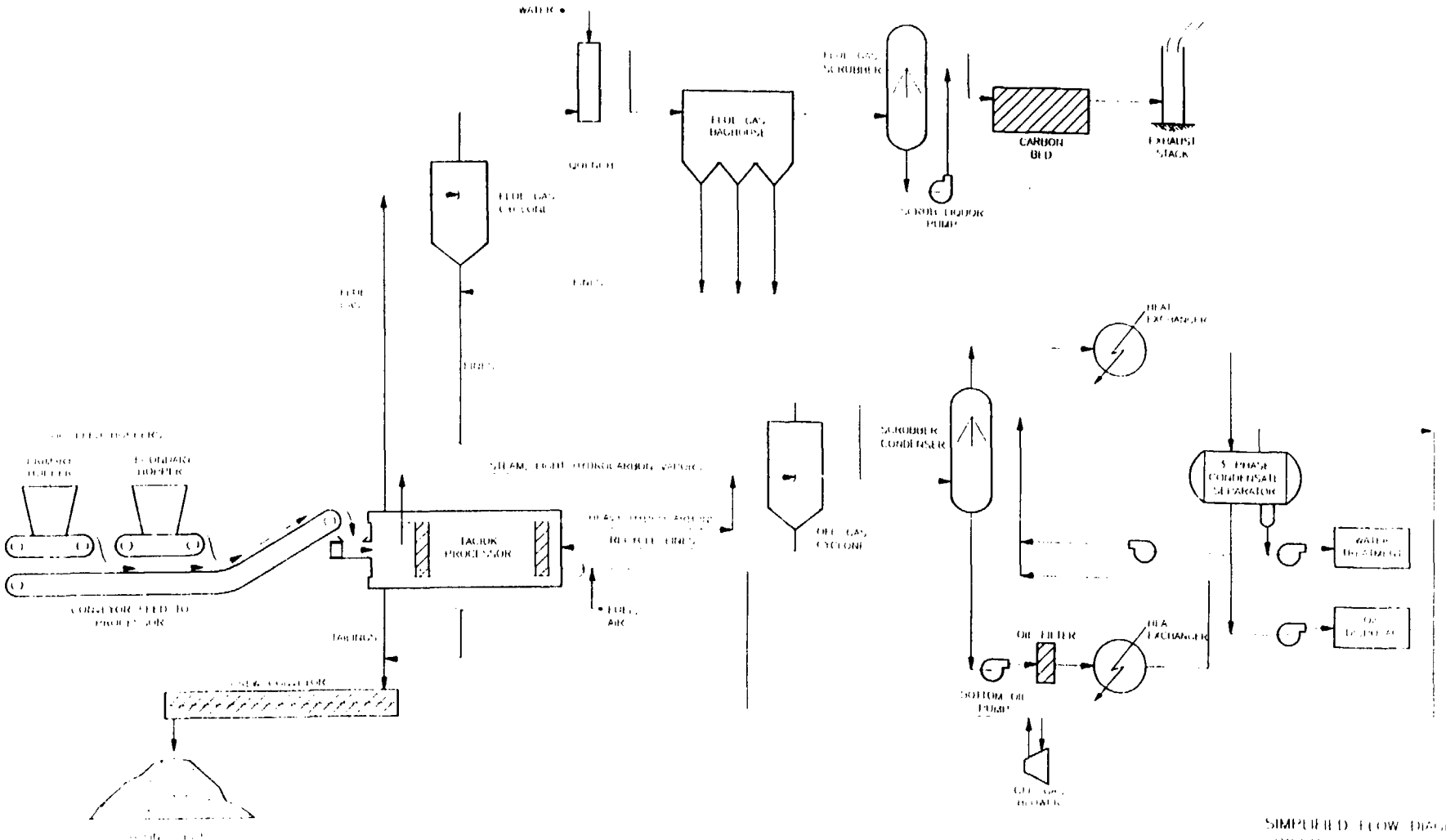
REFERENCE:
FROM "TACIUK PROCESSOR FOR TREATMENT OF OIL CONTAMINATED WASTES", W. TACIUK, R.H. RITCEY, AOSTRA ANNUAL SPRING CONFERENCE "ADVANCES IN PETROLEUM RECOVERY AND UPGRADING TECHNOLOGY" DATED: JUNE, 1987.

Canonie Environmental

DATE: 12-14-92
SCALE: NONE

FIGURE 1

DRAWING NUMBER 92-530-A1



SIMPLIFIED FLOW DIAGRAM
SOILTECH ATP SYSTEMS
GRIFFITH, INDIANA

WARZYN, INC.

Canonie

FIGURE

Figure 3
SoilTech ATP System
Bench-Scale Test Unit

APPENDICES

A

APPENDIX A

TREATABILITY STUDY REPORT BY HAZEN

HAZEN

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AMERICAN CHEMICAL SERVICES
TREATABILITY STUDY

February 26, 1993

Copy No. 1
HRI Project 7684-18

AMERICAN CHEMICAL SERVICES TREATABILITY STUDY

Prepared by:

Jerome P. Downey
Project Manager

Approved by:

Rodney C. Hodgson
Vice President

TABLE OF CONTENTS

INTRODUCTION AND SUMMARY

Hazen Research, Inc. conducted a series of bench-scale treatability tests on samples containing polychlorinated biphenyls (PCBs) from the American Chemical Services Superfund Site in Griffith, Indiana. The samples were prepared by David Pieczynski of Warzyn, Inc. and were shipped to Hazen from their Addison, Illinois office. These samples were packaged and shipped in compliance with the established Hazen and SoilTech protocols. The source samples arrived in two shipments. The first shipment consisted of three 5-gallon pails which were designated ACS-COTREAT 02-02 (HRI No. 46532-1), ACS-COOFF 02-01 (HRI No. 46532-2), and ACS-COOFF 03-01 (HRI No. 46532-3). The second shipment consisted of two 2-gallon pails designated as ACS-TPO2A-01 (HRI No. 46532-4) and ACS-TPO2A-02 (HRI No. 46532-5). Additionally, Hazen received a third shipment of two sets of aliquots from the Warzyn, Inc. analytical laboratory in Madison, Wisconsin. The aliquots, which were acetone-based and contained PCB (Arochlor 1248) as well as certain other organic compounds, were provided to augment or "spike" selected source samples prior to treatability testing. The spiking sets were mixed with Source Samples ACS-COOFF 03-01 (HRI No. 45632-3) and -TPO2A-01 (HRI No. 46532-4) according to instructions from Warzyn, Inc. These two spiked source samples along with ACS-COOFF 02-01 (HRI No. 46532-2) were used in the treatability tests.

The treatability tests were conducted to demonstrate the effectiveness and applicability of the SoilTech Anaerobic Thermal Process (ATP) System in removing organic contamination from these samples. SoilTech has contracted with Hazen to conduct bench-scale treatability tests on soil, sediments, and sludges containing wastes regulated under the Toxic Substance Control Act (TSCA) and the Resource Conservation and Recovery Act (RCRA). SoilTech has elected to have Hazen perform only the treatability tests and selected analytical procedures described herein; interpretation of the analytical data remains within SoilTech's province.

The treatability tests were performed from January 13, 1993, through January 29, 1993. The treatability testing program consisted of nine thermal desorption runs and three combustion runs. Representative samples of the first three source samples (HRI No. 46532-1, 46532-2, and 46532-3), as well as condensate and coked products were sent to Vista Laboratories, Broomfield, Colorado for PCB and other chemical analyses. Representative samples of the two spiked source samples (HRI No. 46532-3 and 46532-4) were sent to Warzyn, Inc.'s analytical laboratory in Madison, Wisconsin for PCB and other chemical analyses. Representative samples of these two spiked source samples were also sent to Vista Laboratories, Broomfield, Colorado, for certain chemical analyses other than PCB.

Pending their disposal, the remaining untreated source samples, process products and residues, and used personnel protective equipment have been collected and temporarily stored at Hazen. In compliance with Hazen's Environmental Protection Agency "Approval to Conduct Research and Development Tests to Dispose of Polychlorinated Biphenyls (PCBs)", the materials will be transported offsite for incineration in an approved PCB disposal facility.

BENCH-SCALE TEST DESIGN AND PROCEDURES

The bench-scale ATP test unit, or batch reactor, was designed to simulate the conditions present in the preheat, reaction, and combustion zones of SoilTech, Inc.'s commercial ATP System. SoilTech evaluates the effects of the process variables on product quality by testing the feedstocks on bench scale. Material balances and product closures are calculated by Hazen at the conclusion of each test as a quality control check.

Chemical analyses of the treatability test products are used to evaluate the effects of thermal treatment. In the American Chemical Services treatability study, samples of the test products were sent to Vista Laboratories, Broomfield, Colorado. The analytical data were reported directly to SoilTech. SoilTech has not requested that Hazen evaluate the efficiency or effectiveness of thermal desorption in the batch tests.

APPARATUS

The bench-scale test unit is an electrically-heated, rotary-drum reactor with internal measurements of 14 inches in diameter and five inches in length. The reactor drum can be rotated at speeds ranging from three to 16 revolutions per minute by an electric, variable-speed drive assembly. The reactor is heated by electrical elements installed on the outside of the steel reactor shell. Two slip-ring series provide electric power to the heaters and obtain the thermocouple outputs. Nine thermocouples located in or around the reactor measure the temperatures of the steel shell (at various locations), the solid charge within the shell (bed temperature), and the temperature of the exiting vapor. Thermocouple signals are digitally displayed and continually processed by a strip chart recorder to indicate the heating profile. The reactor is charged and unloaded through a five-inch access port with a quick-lock cap.

A pipe passing axially through the reactor drive assembly introduces nitrogen purge gas into the reactor during each test run. This nitrogen passes through a gas meter, a rotary seal, and the reactor feed pipe. Nitrogen flow is discontinued once the reactor has been charged and the charge portal sealed. Purge gas, steam, and organic vapors generated while processing the sample exit the reactor and pass through a two-stage condenser system.

The primary condenser is a water-cooled, stainless steel, double-pipe heat exchanger. The condenser is inclined at approximately 45° to allow the condensed liquids to drain by gravity into the collection reservoir. Aqueous and organic fluids accumulate in the reservoir, while the gases disengage and pass upward through a secondary condenser tube (also a water-cooled, double-pipe heat exchanger) situated vertically above the reservoir. Any liquids that condense within this device also drain into the condensate trap. Condensed liquids are recovered and submitted for chemical analysis.

Gases emerge from the secondary condenser, pass through an impinger to remove any remaining moisture or organic mist, and are then discharged through a wet gas meter. This meter measures the total volume of gases evolved during each batch test. After leaving the wet gas meter, the gases pass through a carbon column to the laboratory gas cleaning system.

PROCEDURES

Thermal Desorption Tests

One source sample and two spiked source samples were tested in this treatability study. All the source samples could be generally described as sludge materials. Characterization data provided by SoilTech indicated the PCB contamination levels of the source samples could be as high as 1435 parts per million (ppm). The samples were also reported to contain other organic and inorganic contaminants. The organic contaminants, other than PCBs, were reported to be between 1 and 20%. The inorganic contaminants - lead, barium, chromium(VI), cadmium, and antimony - were reported to be less than 17,200, 6,400, 3,750, 1,700, and 152 parts per million, respectively.

A ramp test was completed on one as-received source sample and on each of the two spiked source samples. In each ramp test, the sample was heated from a relatively low (ambient) initial temperature to approximately 1,200°F. The rate of gas evolution and condensate production with respect to temperature was monitored throughout the test.

The durations of the ramp tests varied, depending on the attainment of specific objectives. These included: 1) the specified bed temperature, 2) cessation of liquid condensate formation, and 3) a decrease in gas evolution to a level below 0.004 actual cubic feet per minute (acf/m). Once the ramp objectives were met, the test was concluded by purging the reactor with nitrogen, removing the reactor lid, and recovering the solid residue. This material was allowed to cool, then weighed and sampled for chemical analysis.

Fixed-temperature retort runs were also conducted on the same as-received source sample and the two spiked samples. The purpose of retort tests is to simulate direct injection of the contaminated material into the retort zone of the full-scale ATP unit. The source sample and each of the two spiked source samples were evaluated in two retort runs with bed temperatures of approximately 1,100 and 1,000°F. The duration of the retort tests was set at 30 minutes. In these tests, roughly equal masses of sample and silica sand were charged to the reactor. The treated solids recovered from these tests were sampled for analysis.

The solids produced by the ramp and retort runs are referred to as "coked solids" because the relatively high reactor-bed temperature, in combination with the absence of oxygen in the reactor atmosphere, results in the formation of coke (carbon), which coats the solid residue particles. The coked solids represent the product of the full-scale ATP unit's retort zone. The coked solids are submitted for organic analysis to determine the degree of decontamination achieved by thermal desorption.

During all ramp and retort runs, aqueous and organic liquid condensates were collected in the condensate reservoir. The condensates were recovered and their masses and volumes measured for the material balances prior to sampling for laboratory analysis. The volume of the gases produced was also measured and recorded for the material balances.

Combustion Tests

In the commercial ATP system, the coked solids move through the combustion zone after being fully decontaminated in the retort zone. Bench-scale combustion testing was performed to represent this step. The combustion test product simulates the final product of the ATP process.

The batch combustion tests were conducted in the same reactor as the ramp and retort tests, and the general combustion test procedure resembles that of the retort tests in many respects. However, in combustion tests, air is continuously passed through the reactor to react with the carbon that coats the solids. A lifter is also installed in the retort to facilitate combustion by lifting and dropping the coked solids through the air stream.

Three combustion tests were performed in this treatability study. The coked solids produced in the 1,000 and 1,100°F retort tests on each sample were blended to produce the three combustion test feed samples. In these tests, the reactor was preheated to approximately 1,200°F and purged with nitrogen before the test charge was loaded. Once the reactor was charged and sealed, the nitrogen flow was discontinued and approximately 15 actual cubic feet per hour (acf/h) of combustion air was injected through the same piping system employed in the retort tests. Likewise, the product gases passed through the gas metering system described previously. The exhaust gases were monitored with an oxygen meter to determine when combustion was completed. Combustion was considered complete when the oxygen content of the exhaust gases was approximately the same as that of the air in the lab. The offgas volume was monitored throughout the test; system gases were discharged through the laboratory ventilation and filtration system. At the conclusion of the combustion test, the combusted solids were removed from the retort, weighed, and prepared for chemical analysis.

RESULTS AND OBSERVATIONS

CHARACTERISTICS OF FEED MATERIAL AND PROCESS RESIDUES

Observations regarding the physical appearance and qualities of the source samples and various process residues (i.e. coked solids, liquid condensate, and noncondensable gases) are summarized below.

Source Samples

Three source samples were received at Hazen on Thursday, December 24, 1992. The samples originated at the American Chemical Services Superfund Site in Griffith, Indiana. The samples were prepared by David Pieczynski of Warzyn, Inc. and were shipped from their Addison, Illinois office before arriving at Hazen. The samples were in compliance with Hazen and SoilTech shipping protocols.

Each of the three source samples was packed in one 5-gallon plastic pail fitted with a locking lid. The pails were clean, dry, intact, and sealed. The samples were logged into Hazen records, assigned a Hazen identification number, and weighed. This information is tabulated below. The Hazen sample identification number (HRI No.) as well as the client's designation will serve to identify each source sample throughout this report.

Client Designation	HRI No.	Gross Weight, kg
ACS-COTREAT 02-02	46532-1	36.4
ACS-COOFF 02-01	46532-2	30.5
ACS-COOFF 03-01	46532-3	29.5

These three source sample containers were first opened and the samples were blended on December 28, 1992. A representative subsample of each source sample was sent to Vista Laboratories, Broomfield, Colorado, for PCB and semivolatile organic compound (SVOC) analysis. Results from the PCB analysis indicated that the PCB concentration for each of the source samples was below 100 parts per billion (ppb).

Two additional source samples were received at Hazen on Wednesday, January 13, 1993. The samples originated at the American Chemical Services Superfund Site in Griffith, Indiana. The samples were prepared by David Pieczynski of Warzyn, Inc. and were shipped from their Addison, Illinois office before arriving at Hazen. The samples were also shipped in compliance with Hazen and SoilTech protocols.

Each of the two additional source samples was packed in one 2.5-gallon plastic pail fitted with a locking lid. The pails were clean, dry, intact, and sealed. The samples were logged into Hazen records, assigned a Hazen identification number, and weighed. This information is tabulated below:

Client Designation	HRI No.	Gross Weight, kg
ACS-TPO2A-01	46532-4	13.3
ACS-TPO2A-02	46532-5	14.0

Based on Warzyn, Inc's decision, only Samples ACS-COOFF 02-01 (HRI No. 46532-2), ACS-COOFF 03-01 (HRI No. 46532-3), and ACS-TPO2A-01 (HRI No. 46532-4) were used in the treatability study. It was further decided by SoilTech that the latter two samples would be spiked with solutions containing PCBs supplied by Warzyn, Inc.

On Monday, January 25, 1993, Hazen received a shipment of spiking solutions prepared by Patrick Letterer of Warzyn, Inc. and shipped from their Madison, Wisconsin laboratory. The shipment contained two sets of spiking solutions. Each set contained four glass bottles with 100 milliliter (ml) aliquots in each bottle. The spike solution concentrations as reported by Warzyn, Inc. are tabulated below:

Set 1

Compound	Concentration per Aliquot (mg/kg)
Aroclor 1248	600
1,1,1-Tricholoethane	15,000
Benzene	6,000
Isophorone	3,000
bis(2-ethylhexyl)phthalate	2,100

Set 2

Compound	Concentration per Aliquot (mg/kg)
1,1,1-trichloroethane	45,000
tetrachloroethane	9,000
methyl ethyl ketone	9,000
trichloroethene	3,000
bis(2-ethylhexyl)phthalate	2,100
bis(2-chloroethyl)ether	225
chrysene	90
Aroclor 1248	1,500

On Tuesday, January 26, 1993, Hazen received instructions for preparing the two spiked source samples from Patrick Letterer of Warzyn, Inc. Following these instructions, source sample ACS-COOFF 03-01 (HRI No. 46532-3) was opened, and the sample was removed and quartered into four clean two-gallon pails. One bottle of the Set 1 spike solutions was added to each quarter (in 25-ml aliquots with blending after each addition). The spiked quarters were then recombined, with blending, into a single pail. Again following the instructions from Warzyn, Source Sample ACS-TPO2A-01 was opened and treated in the same manner as the other source sample except that Set 2 spike solutions were used.

The sample containers for 46532-2, 46532-3 (spiked), and 46532-4 (spiked) were opened for inspection on January 13, 27, and 28, 1993, respectively. The containers were scanned for beta/gamma radiation; no radiation above background levels was detected. Once the container was opened, a photoionization detector was used to measure the concentration of organic vapors in the freeboard above the sample. Organic vapor concentrations for 46532-2, 46532-3 (spiked), and 46532-4 (spiked) were measured at 122, 95, and 163 ppm, respectively. Each of the samples was thoroughly mixed to ensure a representative sample for bench testing and chemical analysis. Hazen observations regarding the color, matrix, and other characteristics of the source sample are detailed below.

- HRI No. 46532-2: ACS-COOFF 02-01 was a brown-grey granular mud material with approximately one-half inch of brown water standing on top. Several brown and white pebbles were also observed. The sample was easily mixed by hand and resembled thick, wet concrete. A screwdriver was easily inserted and stood upright in the blended material. When it was removed, the screwdriver had a thin coating of brown-grey material. The moisture content for the sample was determined to be 21.7% (wet basis) and the ash was 71.3%. Loss on ignition for the ash material was 1.42%.

- HRI No. 46532-3 (spiked): ACS-COOFF 03-01 was a moist dark brown to black soil. The material contained some rocks up to one-half inch in diameter, humus, and a few tan clay chunks that broke apart easily. A screwdriver was easily inserted and stood upright in the blended material. The screwdriver blade was fairly clean upon its removal from the sample. The moisture content for the sample was determined to be 18.6% and the ash was 75.3%. Loss on ignition for the ash material was 2.15%.

- HRI No. 46532-4 (spiked): ACS-TPO2A-01 was a tan sludge material with dark brown crystals up to two inches in diameter, some sand or dirt, and some black streaks of an oil-like substance. The crystals broke up into small flakes with agitation. A screwdriver would not stand upright in the blended material; when removed, it was coated with a tan oily film. The moisture content for the sample was determined to be 29.2% and the ash was 47.5%. Loss on ignition for the ash material was 0.87%.

Particle size data for the source (feed) samples are presented in Appendix A, Tables 1 through 4, and are graphically depicted in Appendix B, Figures 1 through 3. The particle size distribution of a representative sample of the silica used in the retort tests is provided in Appendix A, Table 4, and shown in Figures 1 through 3.

Products

One ramp test was conducted on each of the three samples. Two retort tests at 1,000 and 1,100°F respectively (with a set duration of 30 minutes) were performed for each of the three samples. For each of the three samples, one combustion test was performed on a designated blend of the coked products from the previous retort tests. Hazen's observations of the physical characteristics of the coked solids and liquid condensates from the ramp and retort runs, as well as the combusted solids, are described in the subsequent text. Particle size data for the combustion products and silica sand used in the retort tests are presented in Appendix A, Tables 1 through 3, and graphically depicted in Appendix B, Figures 1 through 3. The approximate material balances for the ramp, retort, and combustion tests are also tabulated in Appendix B. Photographs of the test products appear in Appendix C.

Sample: ACS-COOFF 02-01
Test: **Ramp**

HRI No. 46532-2, Test 18.1: The ramp test with the ACS-COOFF 02-01 source sample was performed on January 13, 1993. In the ramp test, approximately two kilograms (kg) of the source sample were charged to the reactor at ambient temperature (approximately 65°F). The test was completed two hours and 18 minutes after the sample was sealed into the reactor. The final bed temperature was 1,199°F. The total gas volume for the run was 2.116 actual cubic feet (acf). The overall balance closure for the run was 85.7%.

The appearance of the liquid condensate changed throughout the course of the ramp test. These changes are summarized in Table 5 and are described below.

A milky-brown liquid condensate first appeared after the bed temperature reached 190°F. Within five minutes, the condensate formed three phases; the top phase was clear and brown, the middle a cloudy water color, and the bottom a dark brown. By the time the bed temperature had reached 546°F, the top and middle phases had obtained a slight yellow tint. These phases and colorations remained constant until the test was complete. The final condensate volume was 460 ml; the top layer was 80 ml, the middle layer was 340 ml, and the bottom layer was 40 ml.

The coked product was a dusty free-flowing material, some of which adhered to the reactor walls. The reactor required several cleaning steps to retrieve all of the product from the unit. The product was a pinkish tan. Particle size appeared to be less than 60 mesh, with the exclusion of a few one-inch diameter rocks.

Sample: **ACS-COOFF 02-01**
Test: **Retort (30 minutes)**
Temperature: **1,100°F**

HRI No. 46532-2, Test 18.2: The retort test was conducted at the specified final bed temperature of 1,100°F and total time of 30 minutes. Approximately 1 kg of silica was placed in the reactor and preheated to 1,100° before the 1-kg sample was charged. After charging, the bed temperature dropped to 408°F. Two minutes after charging, the bed temperature was 638°F, the gas temperature was 729°F, and the cumulative gas volume was 0.567 acf. After 13 minutes, the bed temperature was 1,111°F, the gas temperature was 236°F, the cumulative gas volume was 1.105 acf, and the gas flow was 0.011 actual cubic feet per minute (acf/m). After 22 minutes, the gas flow had fallen to 0.0040 acf/m. The run was terminated 30 minutes after the sample was charged. The final bed temperature was 1,101°F, the gas temperature was 154°F, the cumulative gas volume was 1.224 acf, and the gas flow was 0.0014 acf/m. The overall balance closure for the run was 99.5%.

There were 240 ml of condensate formed during the run. The condensate had two distinct layers, 40 ml of a black oily solution in the upper layer and 200 ml of a rust-brown solution at the bottom.

The coked product was a slightly dusty, free-flowing material which was easily retrieved from the reactor. The color of the material was a grey-black, but the sand particles were white and did not appear to be coated. The majority of the material appeared to be less than 50 mesh.

Sample: **ACS-COOFF 02-01**
Test: **Retort (30 minutes)**
Temperature: **1,000°F**

HRI No. 46532-2, Test 18.3: The second retort test with this sample was conducted at the specified final bed temperature of 1,000°F and total time of 30 minutes. Approximately 1 kg of silica was placed in the reactor and preheated to 1,060°F before the 1-kg sample was charged. After charging the feed material, the bed temperature dropped to approximately 303°F. After two minutes, the bed temperature had reached 638°F, the gas temperature was 593°F, and the cumulative gas volume was 0.321 acf. After 12 minutes, the bed temperature was 1,025°F, gas temperature was 204°F, the cumulative gas volume was 0.827 acf, and the gas flow was 0.031 acf/m. After 27 minutes, the gas flow was 0.0024 acf/m. The test was terminated 30 minutes after the sample was charged to the reactor; the final bed temperature was 1,010°F, the gas temperature was 141°F, the cumulative gas volume was 0.934 acf, and the gas flow was 0.0013 acf/m. The overall balance closure for the run was 99.8%.

There were 240 ml of condensate formed during the run. The condensate had two distinct layers: 20 ml of a black oily solution in the top layer, and 220 ml of a rusty-brown solution in the bottom layer.

The coked product was a slightly dusty, free-flowing material which was easily retrieved from the reactor. The color of the material was grey-brown. As in the 1,100°F retort test, the sand particles were white and did not appear to be coated. The majority of the material appeared to be less than 50 mesh.

Sample: **ACS-COOFF 03-01(spiked)**
Test: **Ramp**

HRI No. 46532-3 (spiked), Test 18.5: The ramp test with the ACS-COOFF 03-01(spiked) source sample was performed on January 27, 1993. In the ramp test, approximately 2 kg of the source

sample were charged to the reactor at ambient temperature (approximately 65°F). The test was completed two hours and 11 minutes after the sample was sealed into the reactor. The final bed temperature was 1,202°F. The overall balance closure for the run was 96.2%.

The appearance of the liquid condensate changed throughout the course of the ramp test. These changes are summarized in Table 6.

The liquid condensate first appeared when the bed temperature had reached 191°F, it was clear at first but quickly turned brown in color. When the bed temperature had reached 203°F, the single layer of condensate was light brown in color. Five minutes later, the bed temperature was 291°F and the condensate had two layers. The top layer was a tan foam and the bottom layer was an opaque brown. The bottom layer appeared to contain more suspended particles. When the bed temperature reached 585°F, the condensate had three layers. The top layer was clear brown in color at this point; it gained volume slowly and turned black as the bed temperature rose from 585° to 1065°F. The middle layer gained volume, but remained about the same light green-brown color as the temperature was elevated from 585° to 808°F. As the bed temperature rose from 808° to 1065°F, the middle layer remained the same color but declined in volume. The bottom layer was tan in color and remained at the same volume until the bed temperature reached 900°F. The bottom layer remained tan and steadily increased in volume as the bed temperature rose from 900° to 1065°F. At a bed temperature of 1202°F the final volume for the condensate was 400 ml and the condensate had three layers. The top layer was a black solution with a volume of 50 ml, the middle layer was 250 ml of light green-brown solution, and the bottom layer was 100 ml of tan sediment.

The coked product was a dusty free-flowing material, some of which adhered to the reactor walls. The reactor required several stages of cleaning in order to retrieve the product. The material was mostly comprised of fine dark brown to black particles. Approximately 20% of the product material appeared to be in the particle size range of 10 mesh to one-quarter inch in diameter. There were a few white particles in this size fraction, but most of the material was grey to black in color. There were also a few flat metal pieces and a few rocks over one-half inch in diameter.

Sample: **ACS-COOFF 03-01 (spiked)**
Test: **Retort (30 minutes)**
Temperature: **1,100°F**

HRI No. 46532-3 (spiked), Test 18.6: The retort test was conducted at the specified final bed temperature of 1,100°F and total time of 30 minutes. Approximately 1 kg of silica was placed in the

reactor and preheated to 1,120°F before the 1-kg sample was charged. After charging the feed material, the bed temperature fell to approximately 518°F. After three minutes, the bed temperature had reached 835°F, the gas temperature was 514°F, and the cumulative gas volume was 0.368 acf. After 13 minutes, the bed temperature reached 1120°F, the gas temperature was 182°F, the cumulative gas volume was 0.737 acf, and the gas flow was 0.021 acf/m. After 28 minutes, the gas flow was 0.0038 acf/m. The run was terminated 30 minutes after the sample was charged to the reactor. The final bed temperature was 1098°F, the gas temperature was 129°F, the cumulative gas volume was 0.846 acf, and the gas flow was 0.004 acf/m. The overall balance closure for the run was 97.8%.

There were 180 ml of condensate formed during the run. The condensate had two distinct layers: 10 ml of black solution in the upper layer, and 170 ml of brown solution in the bottom layer.

The coked product was a dusty free-flowing material and it was easily retrieved from the reactor. The majority of the material was sand and grey-brown to black fine particles. The sand particles were white and did not appear to be coated. There were a few agglomerated dark brown particles that broke up easily into fine particles. There were also a couple of rocks over one-half inch in diameter.

Sample: **ACS-COOFF 03-01 (spiked)**
Test: **Retort (30 minutes)**
Temperature: **1,000°F**

HRI No. 46532-3 (spiked), Test 18.7: The second retort test with this sample was conducted at the specified final bed temperature of 1,000°F and total time of 30 minutes. Approximately 1 kg of silica was placed in the reactor and preheated to 1,120°F before the 1-kg sample was charged. After charging the feed material, the bed temperature fell to approximately 633°F. After four minutes, the bed temperature had reached 829°F, the gas temperature was 541°F, and the cumulative gas volume was 0.360 acf. After nine minutes, the bed temperature was 995°F, the gas temperature was 219°F, the cumulative gas volume was 0.507 acf, and the gas flow was 0.029 acf/m. After 24 minutes, the gas flow was 0.0034 acf/m. The run was terminated 30 minutes after the sample was charged to the reactor. The final bed temperature was 999°F, the gas temperature was 135°F, the cumulative gas volume was 0.659 acf, and the gas flow was 0.0020 acf/m. The overall balance closure for the run was 101.1%.

There were 200 ml of condensate formed during the run. The condensate had three distinct layers: 10 ml of black solution in the top layer, 150 ml of light brown solution in the middle layer, and 40 ml of brown solids in the bottom layer.

The coked product was a dusty free-flowing material and which was easily retrieved from the reactor. In general, the material was very similar in appearance to the coked product of Test 18.6, except that there were some metallic flakes present up to one-half inch in diameter.

Sample: ACS-TPO2A-01 (spiked)
Test: Ramp

HRI No. 46532-4 (spiked), Test 18.8: The ramp test with the ACS-TPO2A-01(spiked) source sample was performed on January 28, 1993. In the ramp test, approximately 2 kg of the source sample were charged to the reactor at ambient temperature (approximately 65°F). The test was completed one hour and 52 minutes after the sample was sealed into the reactor. The final bed temperature was 1,196°F. The overall balance closure for the run was 96.8%.

The appearance of the liquid condensate changed throughout the course of the ramp test. These changes are summarized in Table 7.

The liquid condensate first appeared when the bed temperature had reached 205°F and was clear brown in color. Two minutes later, the color remained brown but the condensate was no longer clear. When the bed temperature reached 272°F, the condensate had two layers. The top layer was a brown solution and the bottom layer appeared to be a grey sediment. This bottom layer changed to more of a tan color as the bed temperature rose to 447°F. When the bed temperature reached 478°F, the condensate had four layers. The top or first layer was light brown, the second layer was brown, the third layer was light brown, and the bottom or fourth layer was grey. When the bed temperature reached 501°F, the condensate had three layers and there was a white gas visible above the condensate. The top layer was a tan solution that appeared to decrease in volume and turn light brown in color as the bed temperature rose to 566°F. The middle layer was a brown solution that gained in volume as the bed temperature rose to 566°F. The bottom layer appeared to be dark grey solids that gained in volume as the bed temperature rose to 566°F. The white gas had disappeared when the bed temperature reached 626°F and the condensate had four layers. The top or first layer was a grey foam that gained slightly in volume and changed in color to grey and dark brown as the bed temperature rose to 853°F. The second layer was a light brown solution that gained in volume as the bed temperature rose to 853°F. The third layer was a dark brown solution that turned yellow

and appeared to decrease in volume as the bed temperature rose to 853°F. The bottom or fourth layer appeared to be brown sediment that gained in volume as the bed temperature rose to 853°F. When the bed temperature reached 916°F, the condensate had six layers: the top or first layer was 20 ml of grey and black particles, the second layer was 210 ml of light brown solution, the third layer was 20 ml of yellow solution, the fourth layer was 20 ml of black solution, the fifth layer was 160 ml of grey-brown solution, and the bottom or sixth layer was 520 ml of brown sediment. These layers remained unchanged for the duration of the run.

The coked product was a free-flowing material and which was easily retrieved from the reactor. The material was mostly comprised of grey to black fines. Approximately 30% of the material was in a size range of 10 mesh to one-quarter inch in diameter. There were also a few rocks up to one-half inch in diameter.

Sample: **ACS-TPO2A-01 (spiked)**
Test: **Retort (30 minutes)**
Temperature: **1,100°F**

HRI No. 46532-4 (spiked), Test 18.9: The retort test was conducted at the specified final bed temperature of 1,100°F and total time of 30 minutes. Approximately 1 kg of silica was placed in the reactor and preheated to 1,120°F before the 1-kg sample was charged. After charging the feed material, the bed temperature fell to approximately 580°F. After five minutes, the bed temperature had reached 1067°F, the gas temperature was 313°F, and the cumulative gas volume was 0.248 acf. After ten minutes, the bed temperature reached 1132°F, the gas temperature was 258°F, the cumulative gas volume was 0.291 acf, and the gas flow was 0.0086 acf/m. After 15 minutes, the gas flow was 0.0018 acf/m. The run was terminated 30 minutes after the sample was charged to the reactor. The final bed temperature was 1093°F, the gas temperature was 144°F, the cumulative gas volume was 0.301 acf, and the gas flow was less than 0.0002 acf/m. The overall balance closure for the run was 94.1%.

There were 440 ml of condensate formed during the run. The condensate appeared to be only one layer; it was dark brown with visible suspended particles.

The coked product was a dusty free-flowing material and which was easily retrieved from the reactor. The majority of the material was sand and grey to black fine particles. Most of the sand was dark and appeared to be coated. There were some larger particles ranging in size up to one-quarter inch in diameter. There were also some grey flakes.

Sample: ACS-TPO2A-01 (spiked)
Test: Retort (30 minutes)
Temperature: 1,000°F

HRI No. 46532-4 (spiked), Test 18.10: The second retort test was conducted at the specified final bed temperature of 1,000°F and total time of 30 minutes. Approximately 1 kg of silica was placed in the reactor and preheated to 1,020°F before the 1-kg sample was charged. After charging the feed material, the bed temperature fell to approximately 557°F. After three minutes the bed temperature had reached 893°F, the gas temperature was 446°F, and the cumulative gas volume was 0.285 acf. After eight minutes, the bed temperature reached 1037°F, the gas temperature was 267°F, the cumulative gas volume was 0.418 acf, and the gas flow was 0.0266 acf/m. After 18 minutes, the gas flow was 0.0012 acf/m. The run was terminated 30 minutes after the sample was charged to the reactor. The final bed temperature was 1013°F, the gas temperature was 138°F, the cumulative gas volume was 0.459 acf, and the gas flow was less than 0.0002 acf/m. The overall balance closure for the run was 99.9%.

There were 410 ml of condensate formed during the run. The condensate appeared to be only one layer; it was dark brown with visible suspended particles.

The coked product was a dusty free-flowing material and which was easily retrieved from the reactor. In general, the material was very similar in appearance to the coked product of Test 18.9.

Sample: ACS-COOFF 02-01
Test: Combustion

HRI No. 46532-2, Test 18.4: Approximately 500 grams each from Test 18.2 and 18.3 comprised the composite sample of coked solids used as the feed material for this combustion test. The run was complete 22 minutes after the coked solids were charged to the reactor. The overall material balance closure for the run was 98.5%.

The combusted solids were a light, ashed, pink-brown color; the silica particles were white and did not appear to be coated. The material other than the sand appeared to consist of approximately 90% fines, and the balance of the material was approximately 50 mesh.

Sample: ACS-COOFF 03-01 (spiked)
Test: Combustion

HRI No. 46532-3 (spiked), Test 18.11: Approximately 500 grams each from Test 18.6 and 18.7 formed the composite sample used as feed for this combustion test. The run was complete 37 minutes after the coked solids were charged to the reactor. The overall material balance closure for the run was 97.9%.

The combusted solids were a sandy, light brown color; the silica particles were white and did not appear to be coated. The material other than the sand appeared to be greater than 90% fines and the balance of the material ranged from 10 mesh to one-half inch in diameter. The larger particles had white, brown, tan, and grey tones.

Sample: ACS-TPO2A-01 (spiked)
Test: Combustion

HRI No. 46532-4 (spiked), Test 18.12: Approximately 500 grams each from Test 18.9 and 18.10 comprised the feed material for this combustion test. The run was complete 44 minutes after the coked solids were charged to the reactor. The overall material balance for the run was 99.9%.

The combusted solids were a light orange color; the silica particles were white and did not appear to be coated. The material other than the sand appeared to be greater than 90% fines and the balance ranged from 10 mesh to one-half inch in diameter. The coloration of the larger particles included white, brown, tan, and grey tones.

PROCESS RESULTS AND PERFORMANCE DATA

The operating and material balance data recorded during the ramp run and each of the retort runs are summarized in Appendix A, Table 8, and the operating data from the combustion tests are presented in Appendix A, Table 9. The temperature and rate of gas evolution for the ramp and retort tests have been plotted as a function of time; these data are presented in Appendix B, Figures 4 through 12. Photographs of selected test products are included in Appendix C.

APPENDIX A

Tables

Table 1

Particle Size Distribution of ATP Treatment Solids
ACS Site Soil Sludge

Feed ACS-COOFF 02-01, HRI No. 46532-2

U.S. Sieve Size		Direct Wt. %	Cum. Wt. %	
Mesh	Micron		Ret.	Pass.
5	4000	10.0	10.0	90.0
12	1700	10.6	20.6	79.4
20	850	6.2	26.8	73.2
45	355	8.5	35.3	64.7
70	212	23.6	58.9	41.1
100	150	17.1	76.0	24.0
200	75	8.5	84.5	15.5
Pan	<75	15.5	100.0	0.0
TOTAL		100.0		

Retort Combustion Product

U.S. Sieve Size		Direct Wt. %	Cum. Wt. %	
Mesh	Micron		Ret.	Pass.
5	4000	2.2	2.2	97.8
12	1700	3.5	5.7	94.3
20	850	9.5	15.1	84.9
45	355	49.9	65.0	35.0
70	212	11.1	76.1	23.9
100	150	11.4	87.5	12.5
200	75	6.4	93.9	6.1
Pan	<75	6.1	100.0	0.0
TOTAL		100.0		

Table 2

Particle Size Distribution of ATP Treatment Solids
ACS Site Soil/Sludge

Feed ACS-COOFF 03-01, HRI No. 46532-3

U.S. Sieve Size		Direct Wt. %	Cum. Wt. %	
Mesh	Micron		Ret.	Pass.
5	4000	10.5	10.5	89.5
12	1700	7.2	17.6	82.4
20	850	4.8	22.4	77.6
45	355	5.2	28.7	71.3
70	212	19.9	48.6	51.4
100	150	20.6	69.2	30.8
200	75	14.9	84.1	15.9
Pan	<75	15.9	100.0	0.0
TOTAL		100.0		

Retort Combustion Product

U.S. Sieve Size		Direct Wt. %	Cum. Wt. %	
Mesh	Micron		Ret.	Pass.
5	4000	4.4	4.4	95.6
12	1700	3.9	8.3	91.7
20	850	9.9	18.3	81.7
45	355	49.4	67.7	32.3
70	212	8.7	76.3	23.7
100	150	10.8	87.2	12.8
200	75	8.9	96.1	3.9
Pan	<75	3.9	100.0	0.0
TOTAL		100.0		

Table 3

Particle Size Distribution of ATP Treatment Solids
ACS Site Soil/Sludge

Feed ACS-TPO2A-01, HRI No. 46532-4					Retort Combustion Product				
U.S. Sieve Size		Direct Wt. %	Cum. Wt. %		U.S. Sieve Size		Direct Wt. %	Cum. Wt. %	
Mesh	Micron		Ret.	Pass.	Mesh	Micron		Ret.	Pass.
5	4000	3.3	3.3	96.7	5	4000	2.3	2.3	97.7
12	1700	7.9	11.2	88.8	12	1700	3.7	6.1	93.9
20	850	6.4	17.6	82.4	20	850	13.0	19.1	80.9
45	355	6.0	23.5	76.5	45	355	65.1	84.2	15.8
70	212	15.3	38.8	61.2	70	212	4.6	88.7	11.3
100	150	18.2	57.0	43.0	100	150	5.1	93.9	6.1
200	75	16.6	73.6	26.4	200	75	4.9	98.8	1.2
Pan	<75	26.4	100.0	0.0	Pan	<75	1.2	100.0	0.0
TOTAL		100.0			TOTAL		100.0		

Table 4

Particle Size Distribution of ATP Treatment Solids
ACS Site Soil/Sludge

Silica Sand

U.S. Sieve Size		Direct Wt. %	Cum. Wt. %	
Mesh	Micron		Ret.	Pass.
5	4000	0.0	0.0	100.0
12	1700	0.0	0.0	100.0
20	850	17.2	17.3	82.7
45	355	82.6	99.9	0.1
70	212	0.0	99.9	0.1
100	150	0.0	99.9	0.1
200	75	0.0	100.0	0.0
Pan	<75	0.0	100.0	0.0
TOTAL		100.0		

ACS-COOFF 02-01 Ramp Test 18.1, Operator's Observations

Time	Bed Temp. (°F)	Offgas Temp. (°F)	Cumulative Gas Vol. (acf)*	Condensate Volume (ml)**	Layer	Color
0823	61	60				
0830	130	68	0.227			
0835	190	182	0.483	just visible	Total	milky brown
0840	204	202	0.495	20	top	clear brown
				200	middle	cloudy
				20	bottom	dark brown
				240	Total	
0845	265	205	0.501	20	top	clear brown
				280	middle	cloudy
				20	bottom	dark brown
				320	Total	
0850	327	206	0.511	20	top	clear brown
				340	middle	cloudy
				20	bottom	dark brown
				380	Total	
0855	421	205	0.543	20	top	clear brown
				380	middle	cloudy
				20	bottom	dark brown
				420	Total	
0905	546	176	0.630	40	top	yellow brown
				380	middle	cloudy yellow
				20	bottom	dark brown
				440	Total	
0910	510	157	0.700	40	top	yellow brown
				380	middle	cloudy yellow
				20	bottom	dark brown

Time	Bed Temp. (°F)	Offgas Temp. (°F)	Cumulative Gas Vol. (acf)*	Condensate Volume (ml)**	Layer	Color
				440	Total	
0915	677	139	0.807	440	Total	unchanged
0930	831	116	1.117	460	Total	unchanged
0945	980	98	1.473	460	Total	unchanged
1000	1117	89	1.777	460	Total	unchanged
1015	1175	83	1.986	460	Total	unchanged
1030	1190	79	2.185	460	Total	unchanged
1041	1199	77	2.116	460	Total	unchanged

* Actual Cubic Feet ** Milliliters

ACS-COOFF 03-01(spiked) Ramp Test 18.5, Operator's Observations

Time	Bed Temp. (°F)	Offgas Temp. (°F)	Cumulative Gas Vol. (acf)	Condensate Volume (ml)	Layer	Color
0849	Ambient					
0900	158	73	0.311			
0905	200	199	0.486	30	Total	light brown
0910	203	205	0.493	110	Total	light brown
0915	291	213	0.498	5	top	tan
				205	bottom	brown
				210	Total	
0920	352	228	0.505	10	top	tan
				290	bottom	brown
				300	Total	
0925	456	204	0.515	20	top	tan
				320	bottom	brown
				340	Total	
0930	527	189	0.540	340	Total	unchanged
0935	585	175	0.579	20	top	brown
				310	middle	lt green-brown
				20	bottom	tan
				350	Total	
0940	640	161	0.642	20	top	brown
				320	middle	lt green-brown
				20	bottom	tan
				360	Total	
0945	700	146	0.718	360	Total	unchanged

Time	Bed Temp. (°F)	Offgas Temp. (°F)	Cumulative Gas Vol. (acf)	Condensate Volume (ml)	Layer	Color
0950	757	138	0.785	20	top	brown
				330	middle	lt green-brown
				20	bottom	tan
				370	Total	
0955	808	130	0.875	20	top	brown
				340	middle	lt green-brown
				20	bottom	tan
				380	Total	
1000	851	123	0.973	30	top	dk brown
				330	middle	lt green-brown
				20	bottom	tan
				380	Total	
1005	900	118	1.075	40	top	dk brown
				310	middle	lt green-brown
				40	bottom	tan
				390	Total	
1010	961	111	1.174	40	top	dk brown
				290	middle	lt green-brown
				60	bottom	tan
				390	Total	
1015	1012	106	1.275	40	top	dk brown
				270	middle	lt green-brown
				80	bottom	tan

Time	Bed Temp. (°F)	Offgas Temp. (°F)	Cumulative Gas Vol. (acf)	Condensate Volume (ml)	Layer	Color
				390	Total	
1020	1065	102	1.398	50	top	black
				250	middle	lt green-brown
				100	bottom	tan
				400	Total	
1030	1153	97	1.609	400	Total	unchanged
1040	1195	91	1.772	400	Total	unchanged
1050	1193	85	1.849	400	Total	unchanged
1100	1202	82	1.891	400	Total	unchanged

ACS-TPO2A-01(spiked) Ramp Test 18.8. Operator's Observations

Time	Bed Temp. (°F)	Offgas Temp. (°F)	Cumulative Gas Vol. (acf)	Condensate Volume (ml)	Layer	Color
0823	Ambient					
0835	216	197	0.454	60	Total	brown
0840	272	235	0.454	200	top	brown
				40	bottom	grey
				240	Total	
0845	385	198	0.454	230	top	brown
				40	bottom	tan
				270	Total	
0850	447	188	0.454	250	top	brown
				40	bottom	tan
				290	Total	
0855	478	253	0.465	40	top	lt brown
				20	top middle	brown
				200	bottom middle	light brown
				200	bottom	grey
				460	Total	
0900	501	345	0.479	220	top	tan
				80	middle	brown
				500	bottom	dark grey
				800	Total	
0905	566	282	0.492	170	top	lt brown
				100	middle	brown
				600	bottom	dark grey
				870	Total	

Time	Bed Temp. (°F)	Offgas Temp. (°F)	Cumulative Gas Vol. (acf)	Condensate Volume (ml)	Layer	Color
0910	626	241	0.510	10	top	grey
				140	top middle	light brown
				50	bottom middle	dark brown.
				700	bottom	brown
				900	Total	
0915	688	211	0.539	10	top	grey
				170	top middle	light brown
				20	middle bottom	yellow
				720	bottom	brown
				920	Total	
0920	750	184	0.588	10	top	grey & dk brown
				160	top middle	light brown
				20	bottom middle	yellow
				740	bottom	brown
				930	Total	
0925	801	167	0.632	10	top	grey & dk brown
				170	top middle	light brown
				20	bottom middle	yellow
				740	bottom	brown
				940	Total	

Time	Bed Temp. (°F)	Offgas Temp. (°F)	Cumulative Gas Vol. (acf)	Condensate Volume (ml)	Layer	Color
0930	853	150	0.698	940	Total	unchanged
0935	916	135	0.764	20	top(1)	grey & black
				210	(2)	lt brown
				20	(3)	yellow
				20	(4)	black
				160	(5)	grey brown
				520	bottom (6)	brown
				950	Total	
0940	972	123	0.824	950	Total	unchanged
0950	1066	105	0.918	950	Total	unchanged
1000	1144	95	0.988	950	Total	unchanged
1010	1213	88	1.048	950	Total	unchanged
1015	1196	84	1.067	950	Total	unchanged

Table 8

Ramp and Retort Test Summary

Test Number	18.1	18.2	18.3	18.5
Date	12/13/92	12/13/92	12/13/92	1/27/93
Test Type	Ramp	1,100° Retort	1,000° Retort	Ramp
HRI Sample No.	46532-2	46532-2	46532-2	46532-3(s)
Input				
Virgin Feed, g	1585.3	1165.4	1142.1	2030.8
Silica, g	0.0	1000.0	1000.0	0.0
Total, g	1585.3	2165.4	2142.1	2030.8
Output				
Produced Gas, acf	2.116	1.224	0.934	1.891
Produced Gas, g	69.8	40.4	30.8	62.4
Liquid Condensate, g	488.9	248.4	254.6	402.8
Coked Solids, g	799.4	1864.9	1851.9	1488.3
Total, g	1358.1	2153.7	2137.3	1953.2
Balance Closures				
Total Input Basis, %	85.7	99.5	99.8	96.2
Virgin Feed Basis, %	85.7	99.0	99.6	96.2

acf = Actual cubic feet

Test Number	18.6	18.7	18.8	18.9
Date	1/27/93	1/27/93	1/28/93	1/28/93
Test Type	1,100° Retort	1,000 Retort	Ramp	1,100 Retort
HRI Sample No.	46532-3(s)	46532-3(s)	46532-4(s)	46532-4(s)
Input				
Virgin Feed, g	1163.5	1004.4	1995.9	1011.2
Silica, g	1000.0	1000.0	0.0	1000.0
Total, g	2163.5	2004.4	1995.9	2011.2
Output				
Produced Gas, acf	0.846	0.659	1.067	0.301
Produced Gas, g	27.9	21.7	35.2	9.9
Liquid Condensate, g	167.0	194.9	998.3	454.4
Coked Solids, g	1920.4	1809.6	898.2	1429.1
Total, g	2115.3	2026.2	1932.2	1893.4
Balance Closures				
Total Input Basis, %	97.8	101.1	96.8	94.1
Virgin Feed Basis, %	95.9	102.2	96.8	88.4

Test Number	18.10
Date	1/28/93
Test Type	1,000 Retort
HRI Sample No.	46532-4(s)
Input	
Virgin Feed, g	988.3
Silica, g	1000.0
Total, g	1988.3
Output	
Produced Gas, acf	0.459
Produced Gas, g	15.1
Liquid Condensate, g	439.2
Coked Solids, g	1532.7
Total, g	1987.0
Balance Closures	
Total Input Basis, %	99.9
Virgin Fed Basis, %	99.9

Table 9

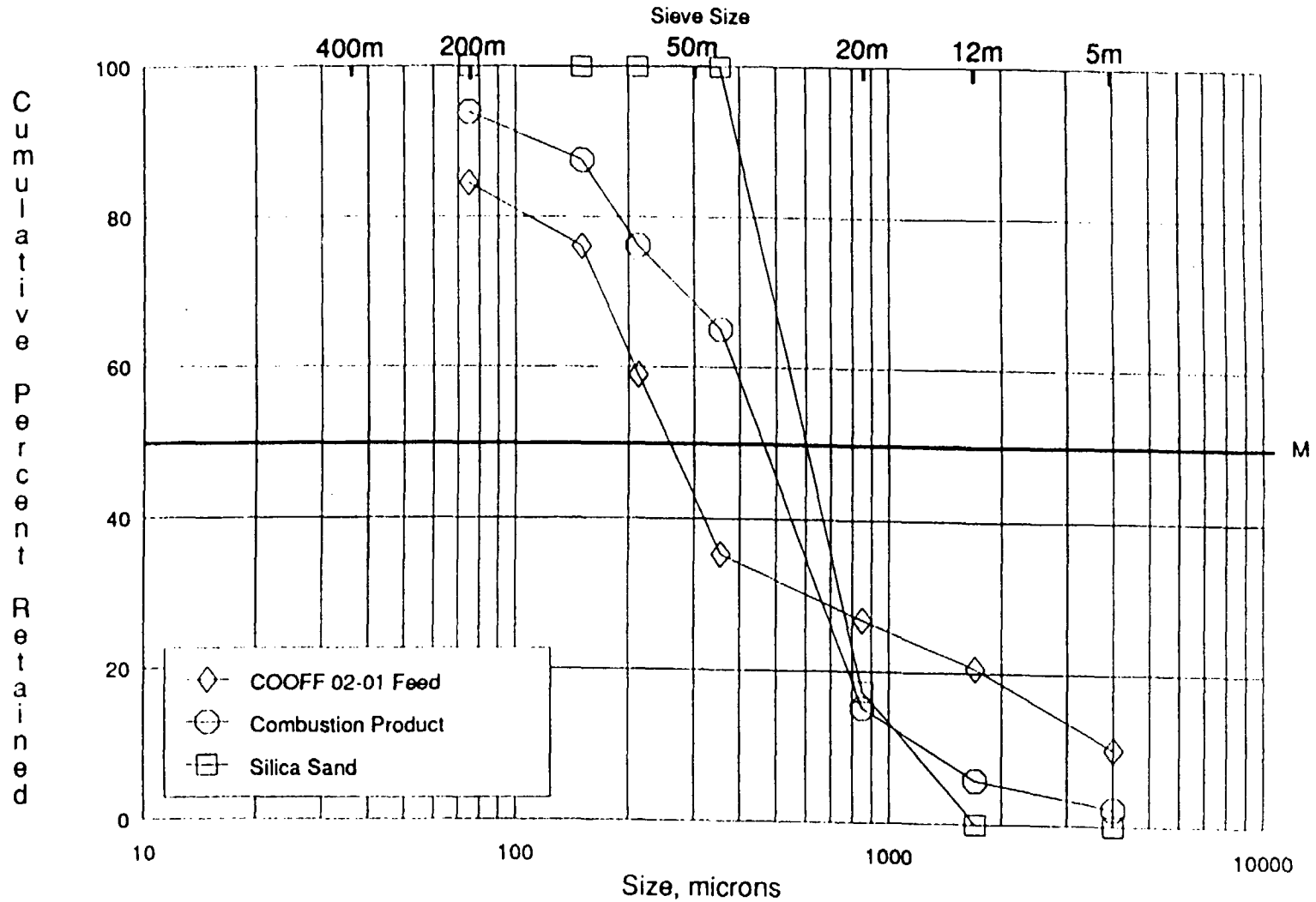
Combustion Test Data

Test Number	18.4	18.11	18.12
Test Date	12/14/92	1/29/93	1/29/93
Feed Material	18.2 & 18.3 Coked Product	18.5 & 18.6 Coked Product	15.4 & 15.5 Coked Product
Retort Charge, g	1018.3	1000.0	1000.0
Run Length, minutes	22	37	44
Combusted Solids	1003.5	979.1	998.9
Offgas Volume, acf	6.276	9.628	10.527
Balance Closure, %	98.5	97.9	99.9

APENDIX B

Figures

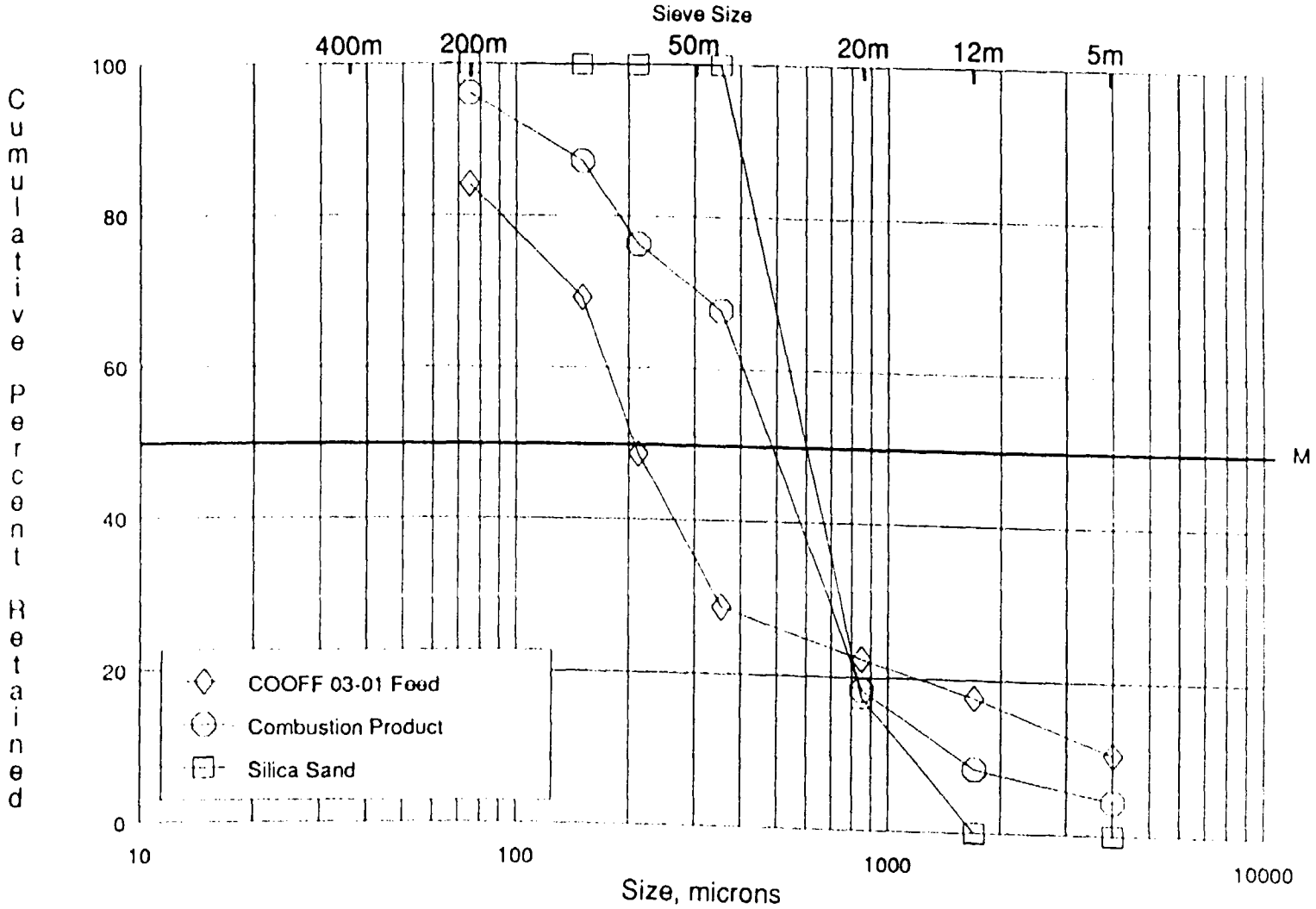
Particle Size Distribution
ACS Site Soil/Sludge



M = Mean Particle Size

Figure 1

Particle Size Distribution
ACS Site Soil/Sludge



M = Mean Particle Size

Figure 2

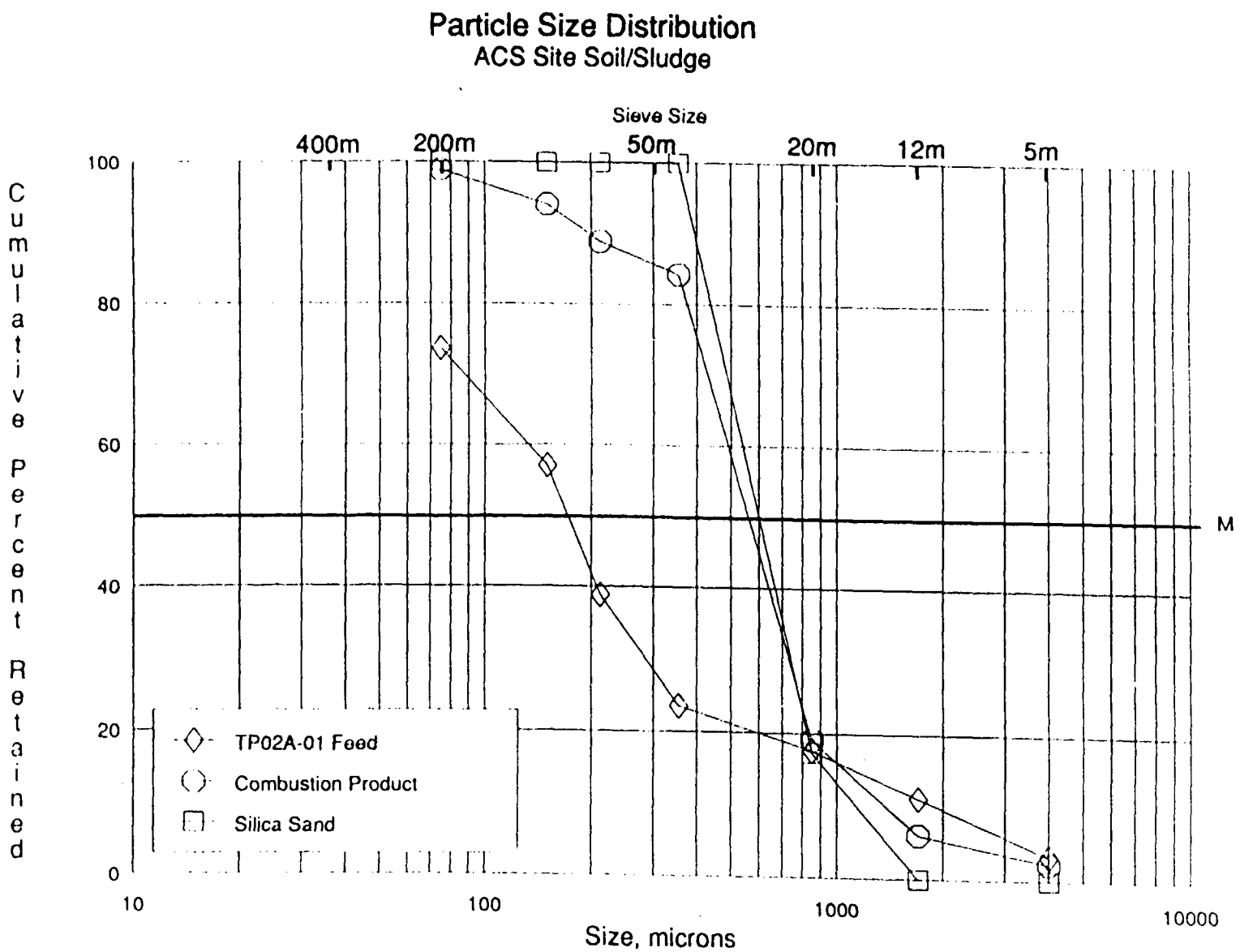

Particle Size Distribution
ACS Site Soil/Sludge
Sieve Size
400m
200m
50m
20m
12m
5m
100
80
60
40
20
0
M
Cumulative Percent Retained
TP02A-01 Feed
Combustion Product
Silica Sand
10
100
1000
10000
Size, microns
M = Mean Particle Size

Figure 3

7684-18 Run 18.1 1200°F Ramp
(Sample COOF 01-02)

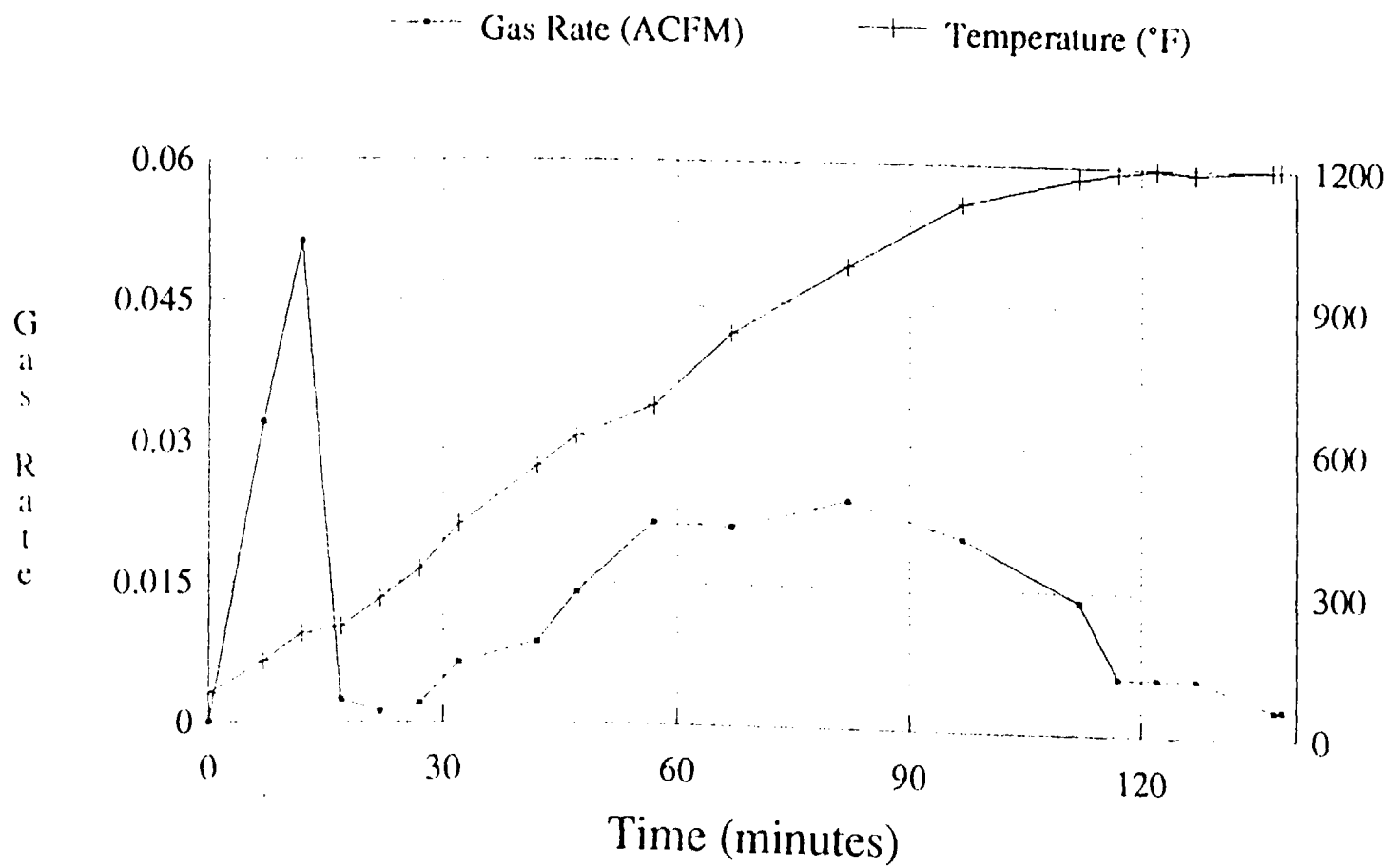


Figure 4

7684-18 Run 18.2 1100°F Retort
(Sample COOF 01-02)

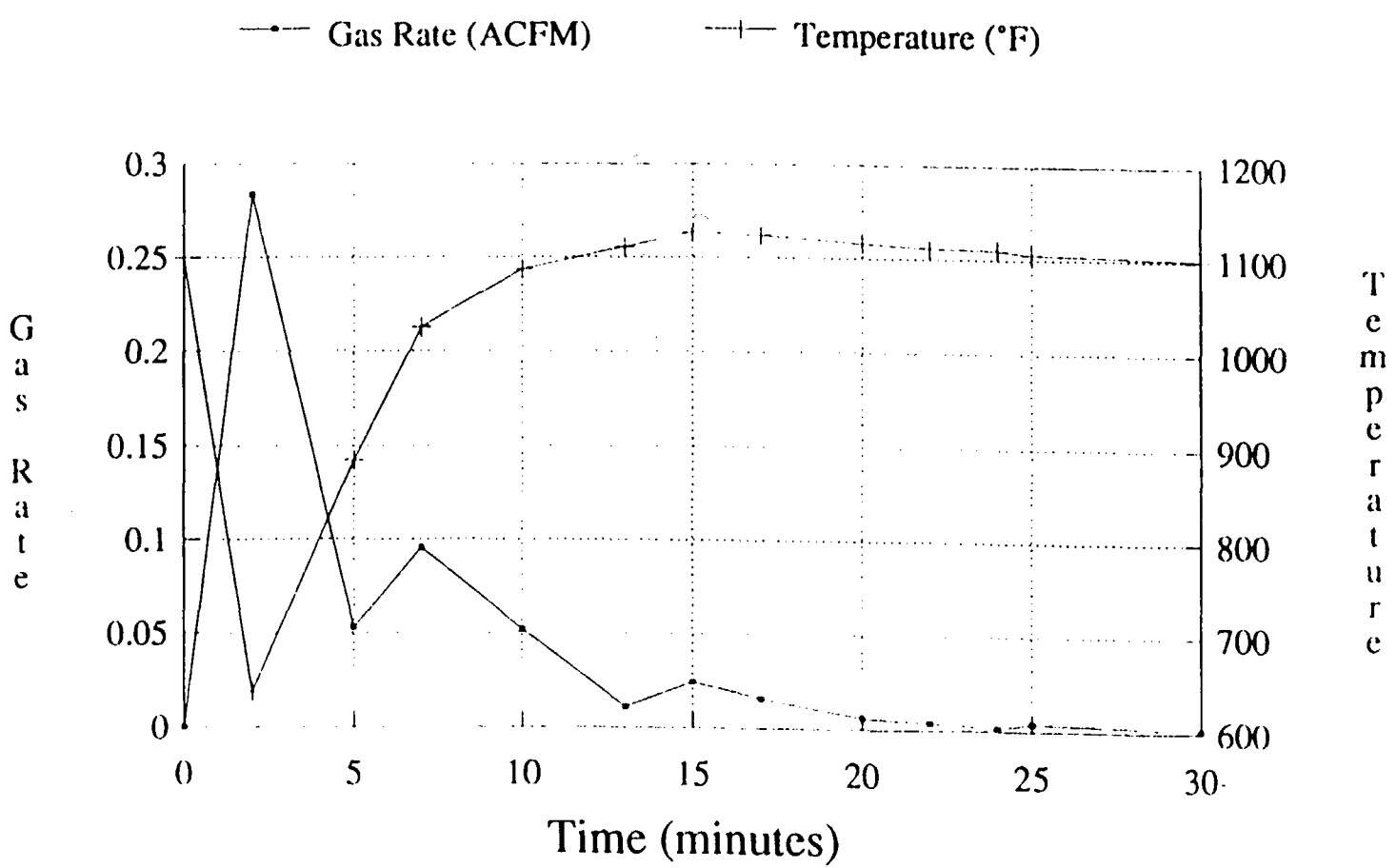


Figure 5

7684-18 Run 18.3 1000°F Retort
(Sample COOF 02-01)

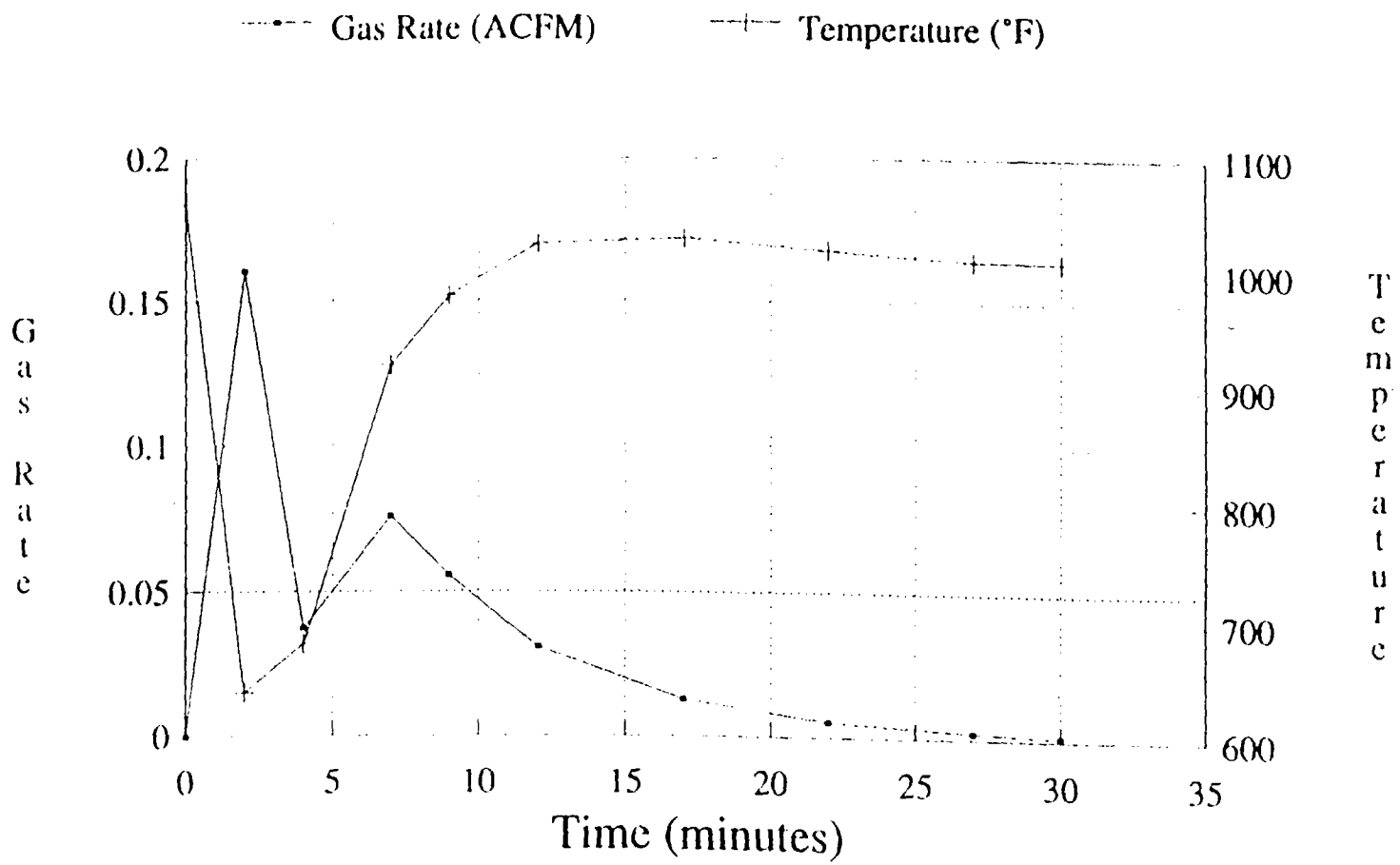


Figure 6

7684-18 Run 18.5 1200°F Ramp
(Sample COOF 03-01)

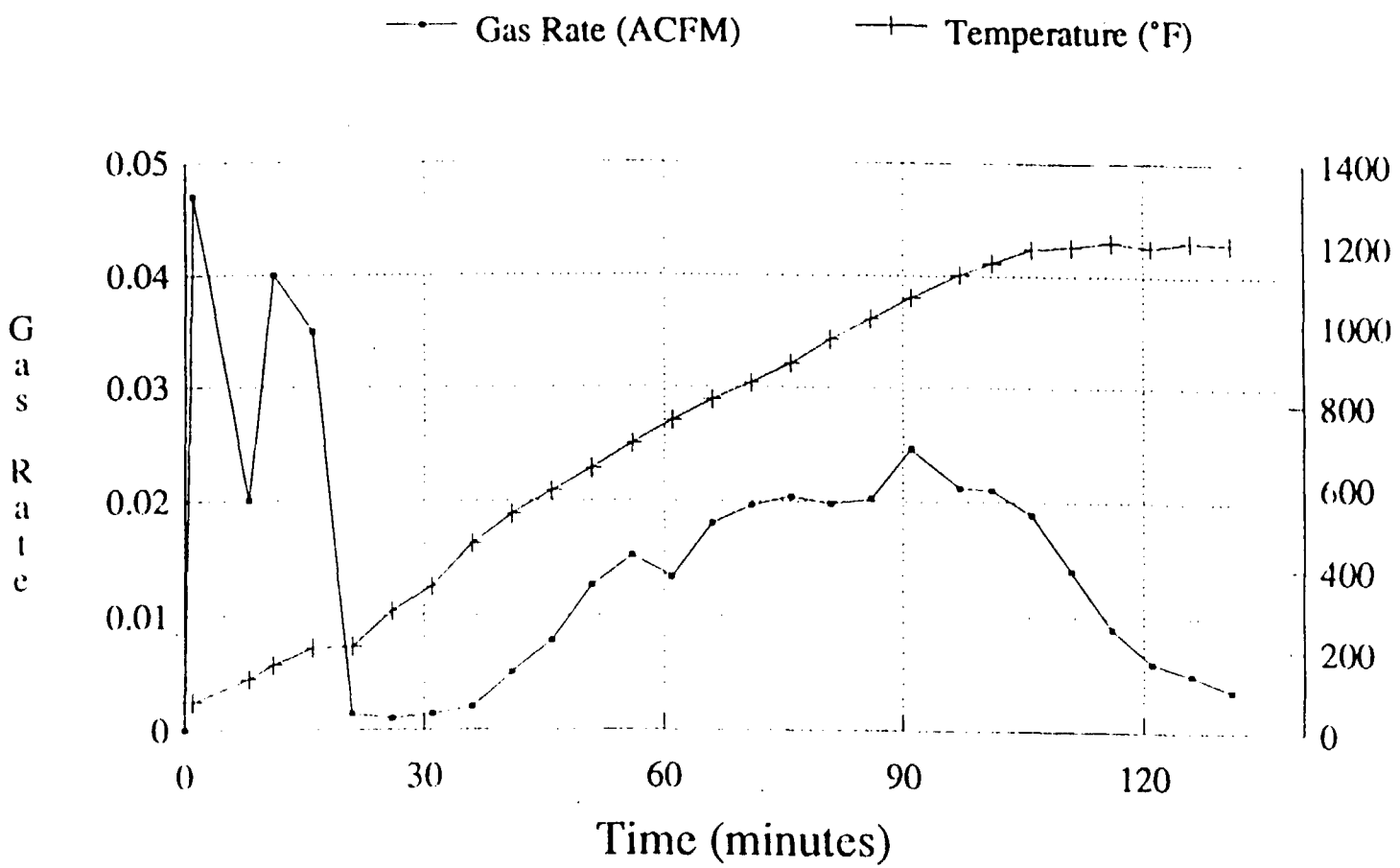


Figure 7

7684-18 Run 18.6 1100°F Retort
(Sample COOF 03-01)

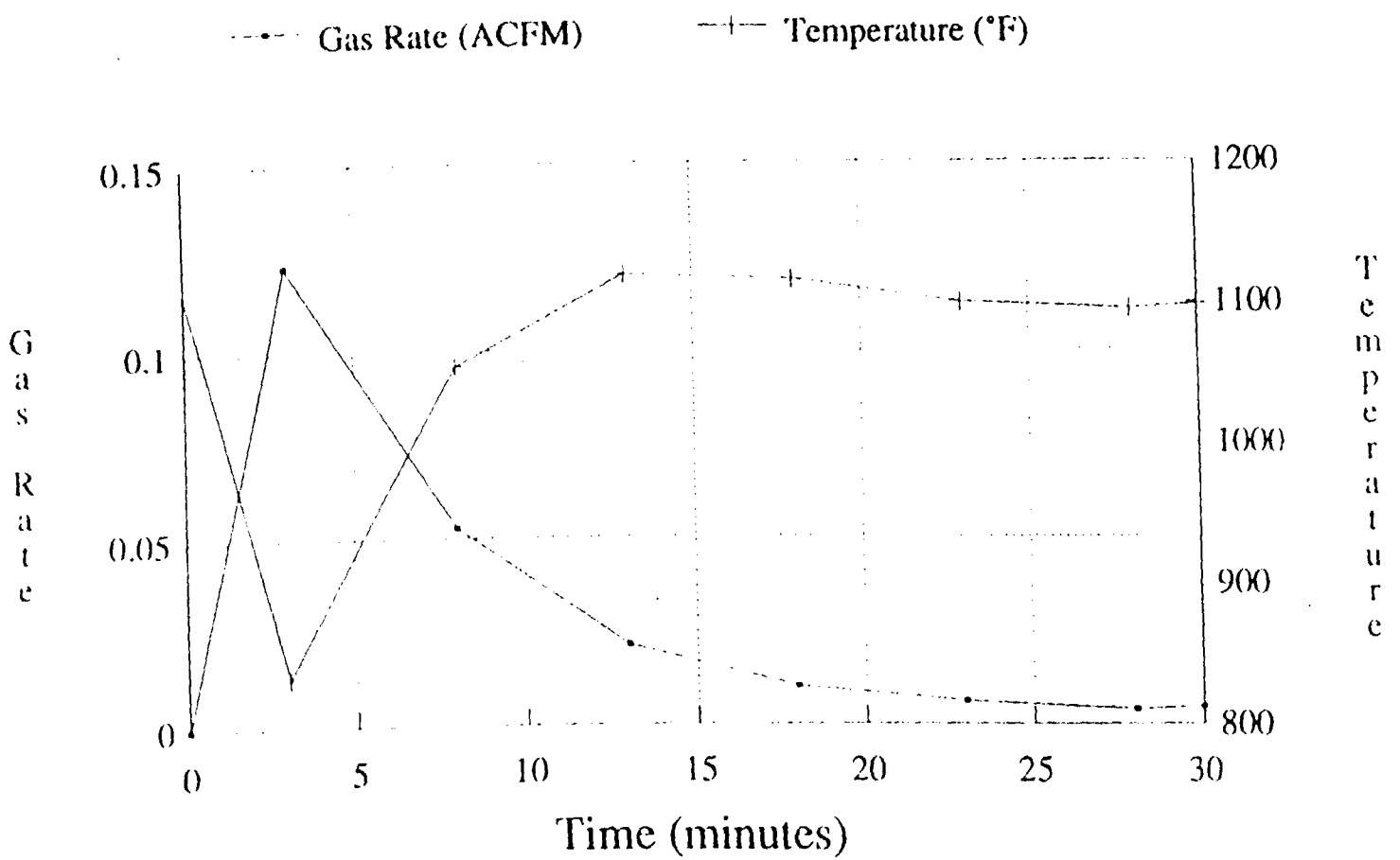


Figure 8

7684-18 Run 18.7 1000°F Retort
(Sample COOF 03-01)

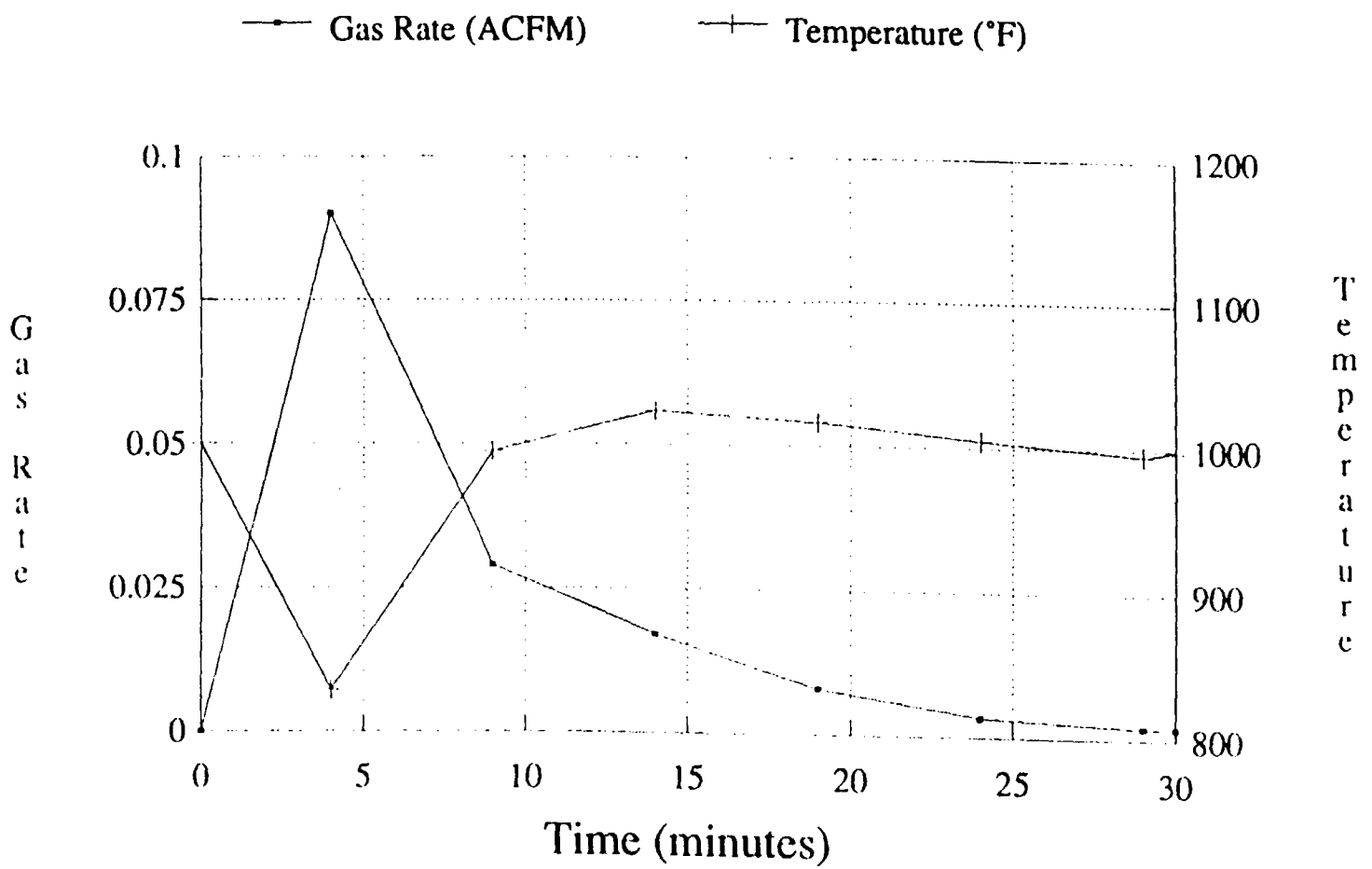


Figure 9

7684-18 Run 18.8 1200°F Ramp
(Sample TP 02A-01)

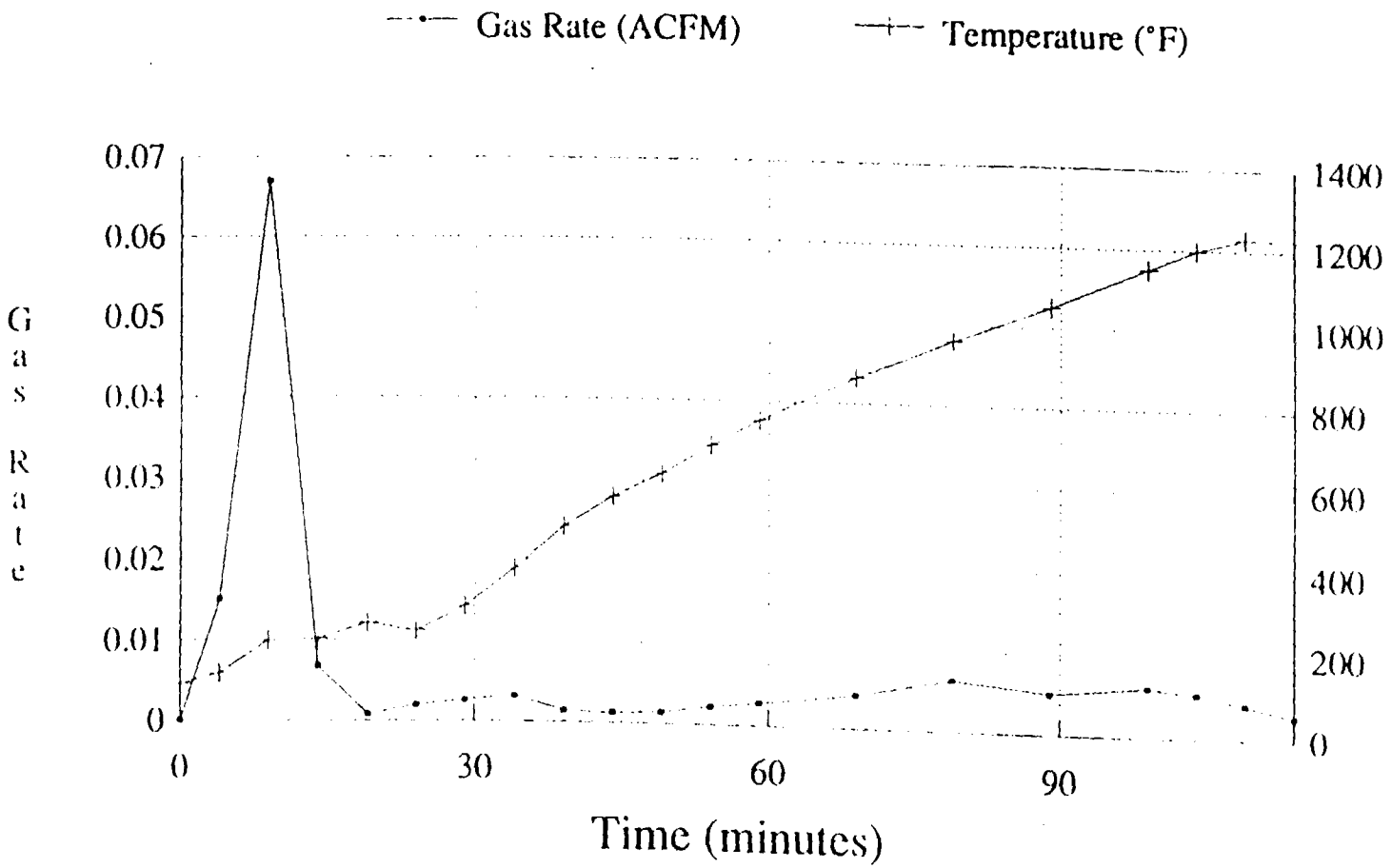


Figure 10

7684-18 Run 18.9 1100°F Retort
(Sample TP 02A-01)

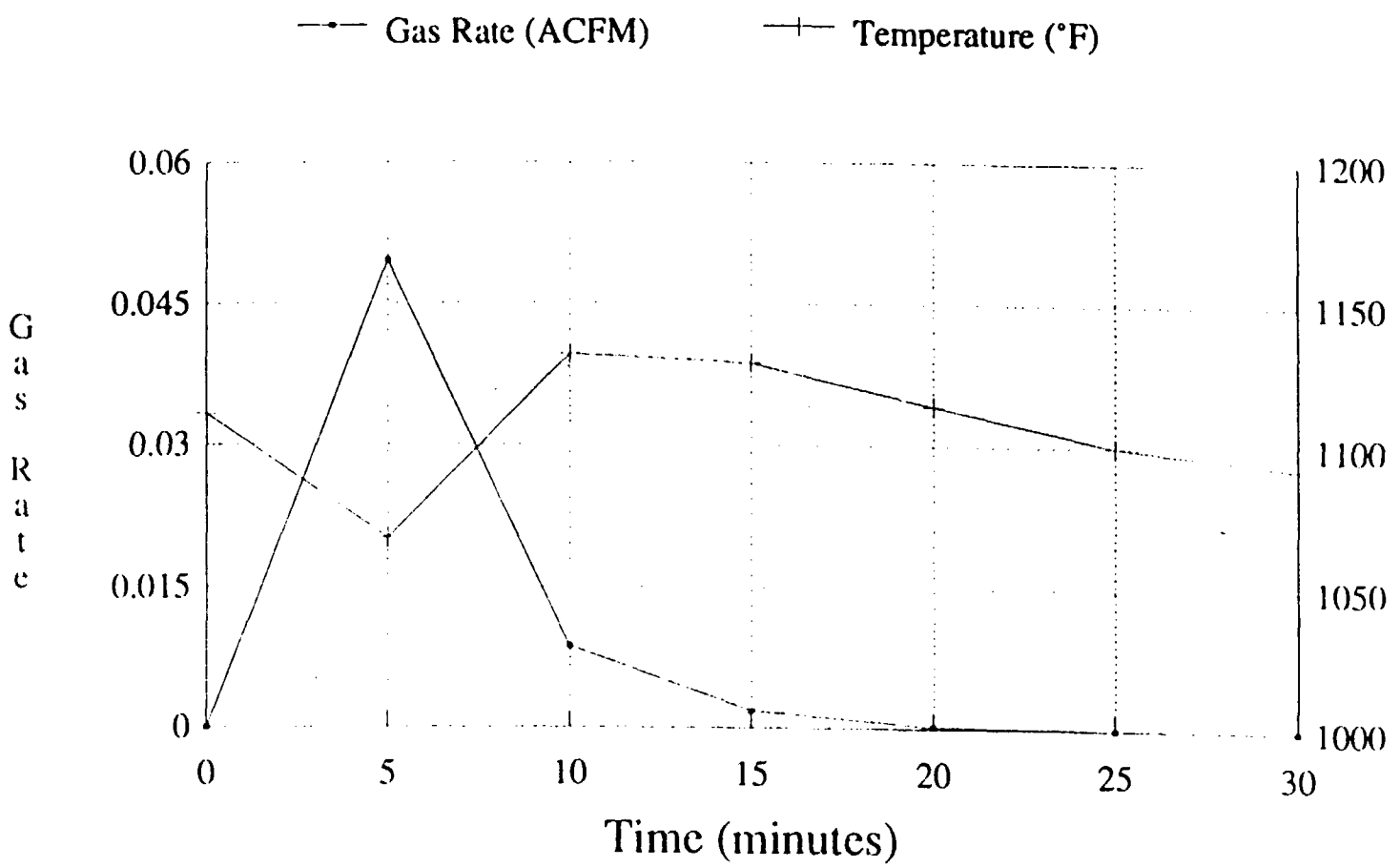


Figure 11

7684-18 Run 18.10 1000°F Retort
(Sample TP 02A-01)

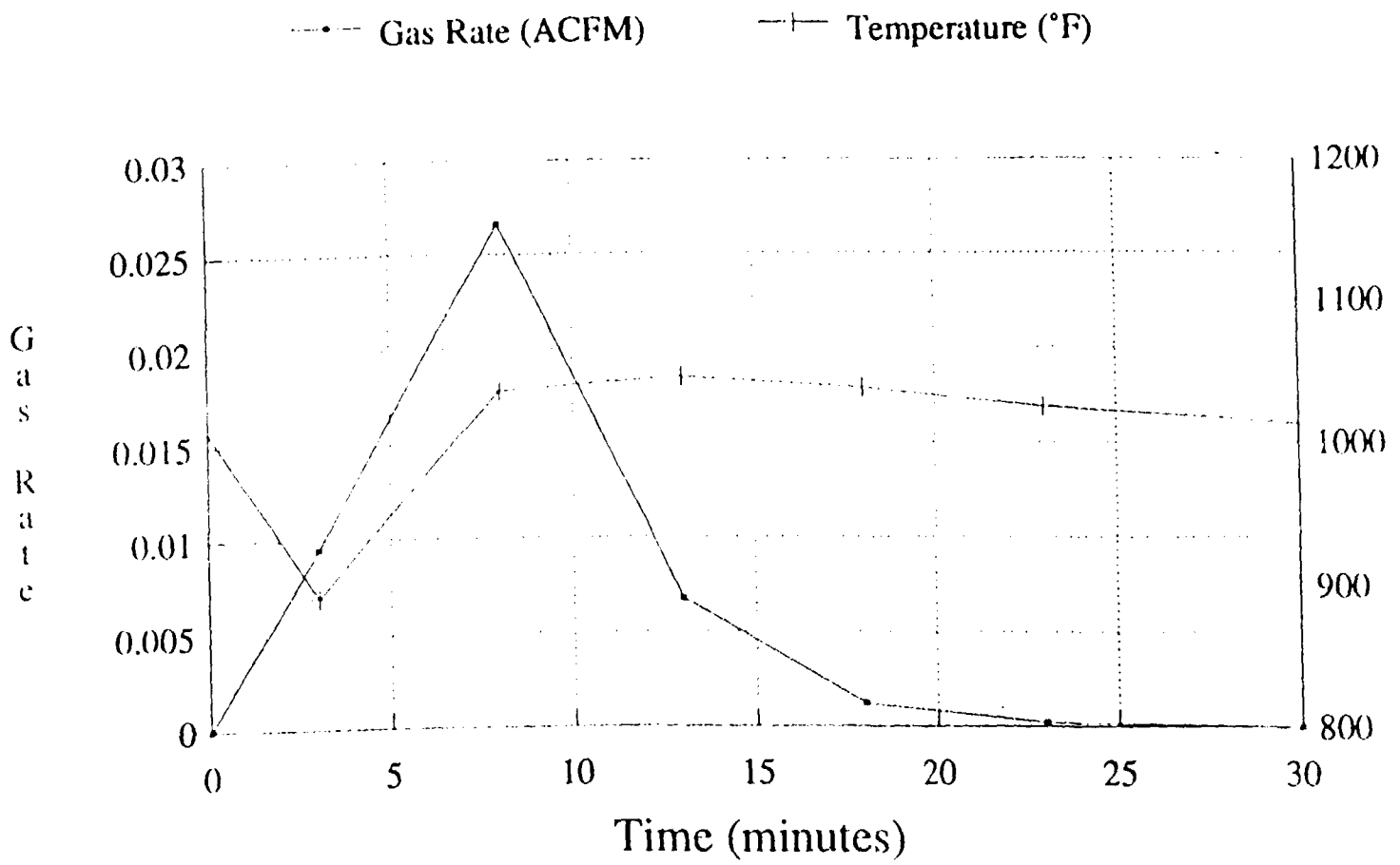


Figure 12

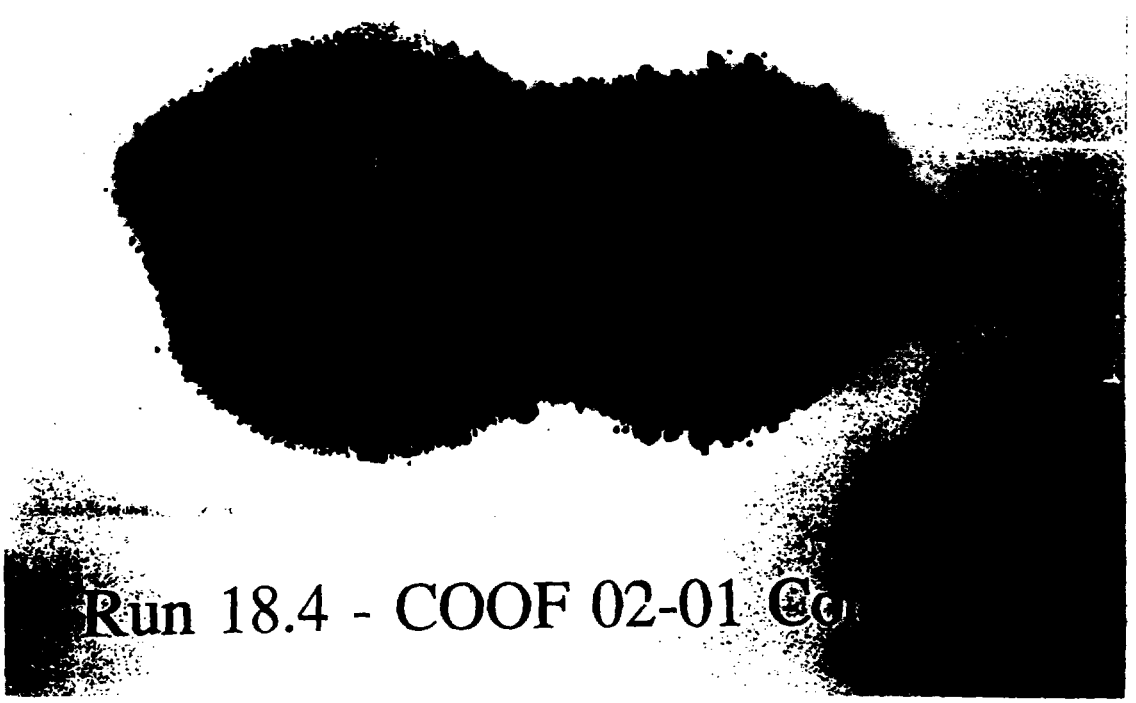
APPENDIX C

Photographs

Run 18.1 - COOF 02-01 Ramp

Run 18.2 - COOF 02-01 Retort 1100 F

Run 18.3 - COOF 02-01 Retort 1000°F



Run 18.4 - COOF 02-01 Co

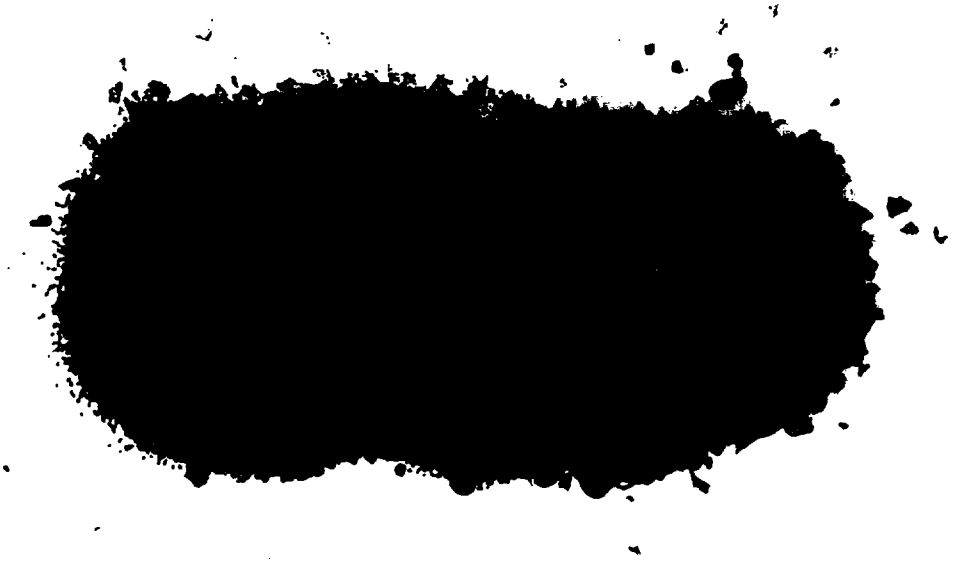
Run 18.5 - COOF 03-01 Ramp

Run 18.6 - COOF 03-01 Retort 1100°F

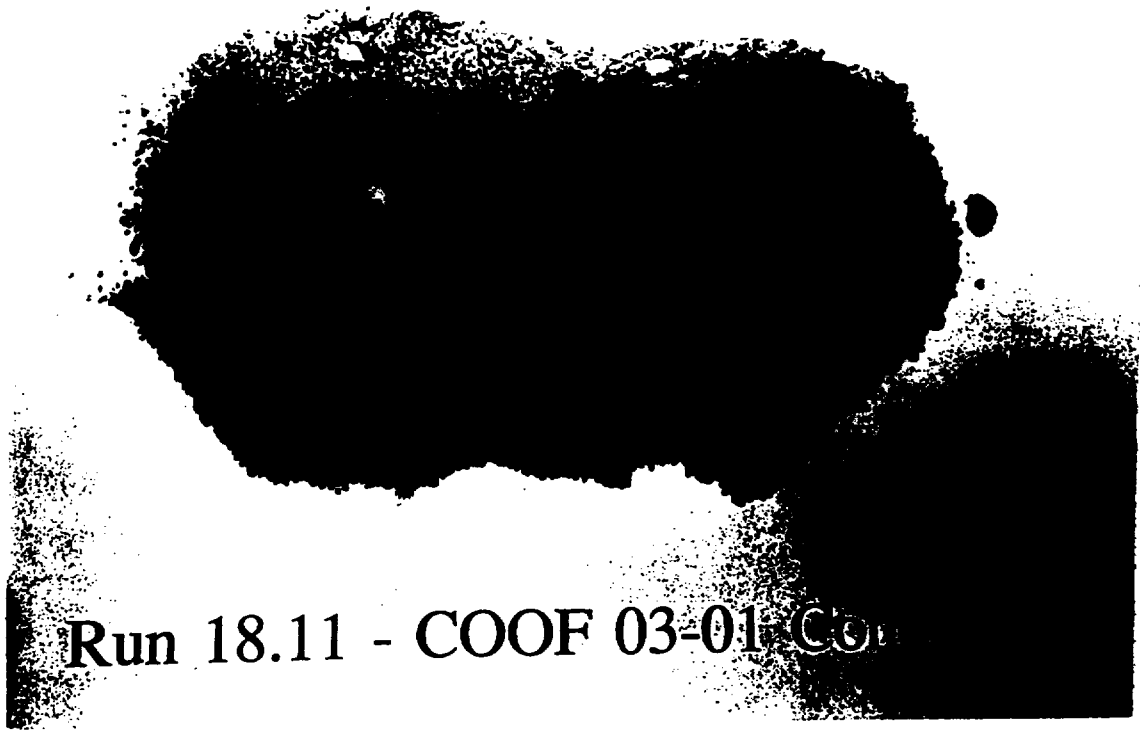
Run 18.7 - COOF 03-01 Retort 1000°F

Run 18.8 - TS 02A-01 Ramp

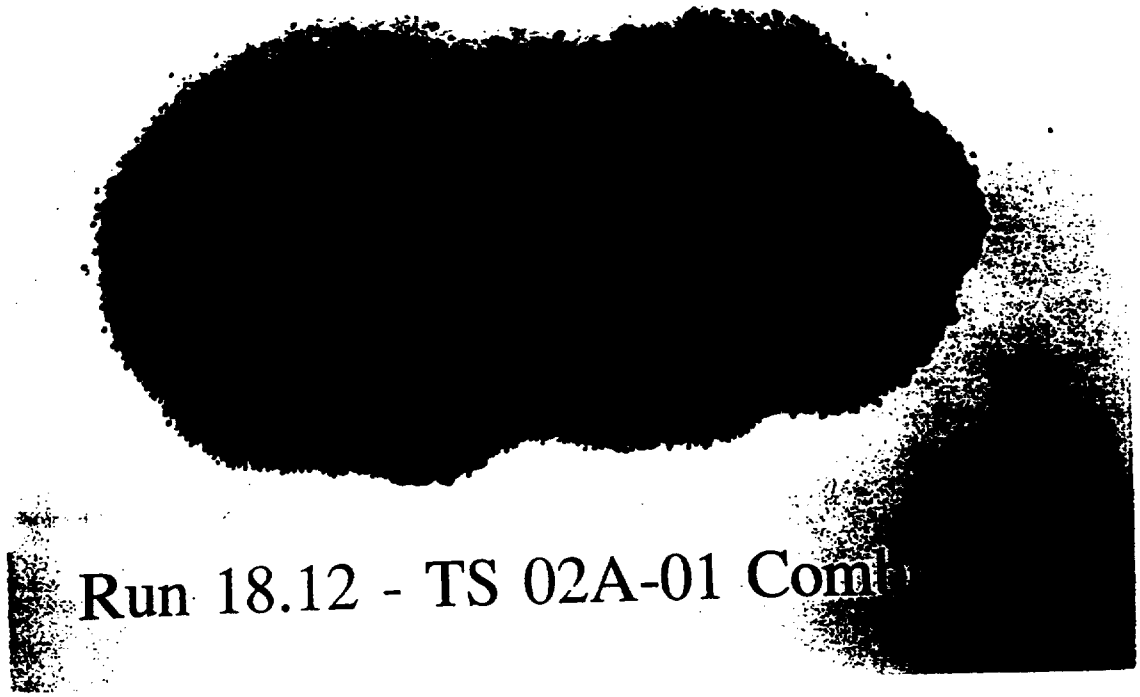
Run 18.9 - TS 02A-01 Retort 1100°F



Run 18.10 - TS 02A-01 Retort 1000°F



Run 18.11 - COOF 03-01 Co



Run 18.12 - TS 02A-01 Com

B

APPENDIX B

ATP BENCH-SCALE SYSTEM DESCRIPTION

5. Pollution Control System

The ATP Bench Unit is enshrouded by a hood and a vent system. Any vented air discharges into the laboratory hood, which is equipped with a HEPA/carbon filter. Off-gases from the processor/combustor are passed through a carbon column to remove any residual organic contaminants before discharging the gas into the laboratory hood. In the hood, the off-gas mingles with any vented air and passes through the HEPA/carbon filter before being discharged to the atmosphere. These multiple protection levels are designed and provided to totally protect public and personnel from exposure to the off-gas.

Raw Materials and Chemical

The standard bench tests use clean sand as the reactor charge, added with or before the waste feed sample. The ratio of sand to waste sample can vary widely and is used to determine target values for optimum internal recycle of coked sand in the ATP unit. In the full-scale system, the coked sand recycles from the annular region of the ATP unit back into the reaction zone. This recycle affects heat transfer and net throughput rates most strongly, and to a lesser extent, may affect pyrolysis (thermal cracking) behavior and agglomeration of solid fines into larger particles.

Some wastes have substantial amounts of sulfur and exhibit low pH values. To reduce the corrosivity of the fluids, a series of neutralization tests may be conducted on the feed material. Lime or limestone may be mixed with the sample before adding it to the processor. The acidity of product water and treated solids may be analyzed to assess the effectiveness of this neutralization.

APPENDIX C

ATP BENCH-SCALE TEST PROCEDURES

APPENDIX C
ATP BENCH-SCALE TEST PROCEDURES

Types of Batch Tests

Three types of tests simulating full-scale continuous operations will be conducted during a treatability study. These types of tests are identified and discussed below.

1. Ramp Test

The ramp test is so named because the temperature of a waste material is gradually increased during the test. The ramp test is the first test run on a given material. A sample of the material is introduced into the drum, and the temperature is gradually increased from ambient to a temperature at which volatilization is complete. The amount of volatilized material (condensed liquid and noncondensable gas) is measured as a function of time and temperature. The ramp test characterizes the volatility of the waste material, and identifies the temperature at which volatilization is complete. This information is used to set the initial operating conditions for the retort test, the key test for demonstrating this technology's viability. The information obtained during the ramp test is also important from a safety standpoint, particularly for samples with high hydrocarbon and/or water content.

2. Retort Test

The retort, or pyrolysis, test follows the ramp test and is the key test that demonstrates the thermal efficiency and overall viability of the SoilTech ATP Technology. This test realistically simulates the effect of full-scale process conditions. Retort tests are conducted at a constant temperature, as discussed below. Several tests may be run at different temperatures. The initial test temperature is determined by the ramp test.

APPENDIX D

TEST RESULTS

Sample Description

Laboratory ID	Client ID	Type	Date Received
935754-001	18.1-46532-2-S1	Soil	01.13.93
935754-002	18.2-46532-2-S2H	Soil	01.13.93
935754-003	18.3-46532-2-S2L	Soil	01.13.93
935754-004L	18.23-46532-2-L1(O)	Waste	01.13.93
935754-004U	18.23-46532-2-L1(W)	Waste	01.13.93

Results and Discussion

VISTA Project # 935754

Three soil samples and two waste samples were received on January 13, 1993, for the determination of total recoverable petroleum hydrocarbons, simulated distillation, organochlorine pesticides/PCB's, volatile organic compounds, semivolatile organic compounds, oil and grease and TOC. The samples were analyzed according to the protocols described in USEPA SW-846, Test Methods for Evaluating Solid Waste, 3rd Ed. and Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-02.

Surrogate recoveries were low for the volatile analyses of sample 935754-002 (your ID 18.2-46532-2-S2H). The sample was reanalyzed with similar results indicating a sample matrix effect. Surrogate recovery for Toluene d-8 was high for sample 935754-003 (your ID 18.3-46532-2-S2L). The sample was reanalyzed with similar results, indicating a matrix interference.

Semivolatile surrogate recoveries were erratic for sample 935754-004 (your ID 18.23-46532-2-L1). The high recoveries can be traced to matrix interferences in the sample analysis.

VISTA samples 935754-001, -002 and -003 (your ID's 18.1-46532-2-S1, 18.2-46532-2-S2H and 18.3-46532-2-S2L) were analyzed for TOC by Huffman Laboratories. Their results are enclosed.

Total Recoverable Petroleum Hydrocarbons
EPA Method 418.1

Client: Soil Tech
Client Sample ID: 18.1-46532-2-S1
VISTA Sample ID: 935754-001 Sample Type: Soil
Date Sampled : 01/13/93 Date Received: 01/13/93
Date Extracted: 01/18/93 Date Analyzed: 01/18/93

Analyte	Result	Reporting Limit	Units
TRPH	12,000	40	mg/kg

Simulated Distillation/Total Petroleum Hydrocarbons
GC/FID - ASTM D2887/CDHS Method

Client: Soil Tech
Client Sample ID: 18.1-46502-2-S1
VISTA Sample ID: 935754-001 Sample Type: Water
Date Sampled : 01/13/93 Date Received: 01/13/93
Date Extracted: 01/15/93 Date Analyzed: 01/15/93

Hydrocarbon - Boiling Point		% Eluting
C_7	- 98°C	4 %
C_8	- 126°C	17 %
C_9	- 151°C	49 %
C_{10}	- 174°C	63 %
C_{11}	- 196°C	75 %
C_{12}	- 216°C	81 %
C_{14}	- 254°C	84 %
C_{16}	- 287°C	85 %
C_{18}	- 316°C	86 %
C_{20}	- 344°C	86 %
C_{24}	- 391°C	90 %
C_{28}	- 431°C	95 %
C_{32}	- 466°C	96 %
C_{36}	- 496°C	100 %
C_{40}	- 522°C	100 %
C_{44}	- 545°C	100 %

	Result	Reporting Limit	Units
Total Petroleum Hydrocarbons	<	0.5	mg/L

< = Compound not detected at or above the listed reporting limit.

Volatile Organic Compounds - EPA Method 8240

Client: Soil Tech
Client Sample ID: 18.1-46500-1-01
VISTA Sample ID: 935754-001 Sample Type: Soil
Date Sampled : 01/13/93 Date Received: 01/13/93
Date Analyzed: 01/26/93

Analyte	Result	Reporting Limit	Units
Chloromethane	<	200	mg/kg
Bromomethane	<	200	mg/kg
Vinyl Chloride	<	200	mg/kg
Chloroethane	<	200	mg/kg
Methylene Chloride	1,500	100	mg/kg
Acetone	(110)*	2,000	mg/kg
Carbon Disulfide	<	100	mg/kg
1,1-Dichloroethene	(30)*	100	mg/kg
1,1-Dichloroethane	100	100	mg/kg
1,2-Dichloroethenes, total	<	100	mg/kg
Chloroform	(43)*	100	mg/kg
1,2-Dichloroethane	3,200	100	mg/kg
2-Butanone	(560)*	2,000	mg/kg
1,1,1-Trichloroethane	1,300	100	mg/kg
Carbon Tetrachloride	<	100	mg/kg
Vinyl Acetate	<	1,000	mg/kg
Bromodichloromethane	<	100	mg/kg
1,2-Dichloropropane	(27)*	100	mg/kg
Trans-1,3-Dichloropropene	(25)*	100	mg/kg
Trichloroethene	3,700	100	mg/kg
Dibromochloromethane	(28)*	100	mg/kg
1,1,2-Trichloroethane	<	100	mg/kg
Benzene	490	100	mg/kg
Cis-1,3-Dichloropropene	(22)*	100	mg/kg
2-Chloroethyl Vinyl Ether	<	200	mg/kg
Bromoform	(28)*	100	mg/kg
4-Methyl-2-Pentanone	<	1,000	mg/kg
2-Hexanone	<	1,000	mg/kg
Tetrachloroethene	1,400	100	mg/kg
1,1,2,2-Tetrachloroethane	<	100	mg/kg
Toluene	2,200	100	mg/kg
Chlorobenzene	(67)*	100	mg/kg
Ethylbenzene	870	100	mg/kg
Styrene	420	100	mg/kg
Xylenes, total	3,700	100	mg/kg

Surrogate Recoveries		QC Limits
Toluene-d_8	[illegible]	[illegible]
4-Bromofluorobenzene	[illegible]	[illegible]
1,2-Dichloroethane-d_4	94	[illegible]

* Detected below reporting limit; quantitation may be unreliable.
< = Compound not detected at or above the listed reporting limit.

Oil and Grease
Gravimetric - Modified EPA Method 9070

Client: Soil Tech
Client Sample ID: 18.1-46830-2-S1
VISTA Sample ID: 935754-001 Sample Type: Soil
Date Sampled : 01/13/93 Date Received: 01/13/93
Date Analyzed: 01/15/93

Analyte	Result	Reporting Limit	Units
Oil and Grease	12,000	50	mg/kg

Total Recoverable Petroleum Hydrocarbons
EPA Method 418.1

Client: Soil Tech
Client Sample ID: 18.2-46530-2-SCH
VISTA Sample ID: 935754-002 Sample Type: Soil
Date Sampled : 01/13/93 Date Received: 01/13/93
Date Extracted: 01/18/93 Date Analyzed: 01/18/93

Analyte	Result	Reporting Limit	Units
TRPH	<	40	mg/kg

< Compound not detected at or above the listed reporting limit.

Polychlorinated Biphenyls
EPA Method 8080

Client: Soil Tech
Client Sample ID: 18.2-46532-2-S2H
VISTA Sample ID: 935754-002 Sample Type: Soil
Date Sampled : 01/13/93 Date Received: 01/13/93
Date Extracted: 01/21/93 Date Analyzed: 01/25/93

Analyte	Result	Reporting Limit	Units
PCB-1016	<	3	mg/kg
PCB-1221	<	3	mg/kg
PCB-1232	<	2	mg/kg
PCB-1242	<	1	mg/kg
PCB-1248	<	1	mg/kg
PCB-1254	<	1	mg/kg
PCB-1260	<	1	mg/kg

Surrogate Recoveries			QC Limits
Dibutyl Chlorendate (DBC)	85	%	41-140

< = Compound not detected at or above the listed reporting limit.

Volatile Organic Compounds - EPA Method 8240

Client: Soil Tech
Client Sample ID: 18.2-46532-2-S2H
VISTA Sample ID: 935754-002 Sample Type: Soil
Date Sampled : 01/13/93 Date Received: 01/13/93
Date Analyzed: 01/26/93

Analyte	Result	Reporting Limit	Units
Chloromethane	14	10	ug/kg
Bromomethane	<	10	ug/kg
Vinyl Chloride	<	10	ug/kg
Chloroethane	<	10	ug/kg
Methylene Chloride	190	5	ug/kg
Acetone	4400	100	ug/kg
Carbon Disulfide	12	5	ug/kg
1,1-Dichloroethene	<	5	ug/kg
1,1-Dichloroethane	8.1	5	ug/kg
1,2-Dichloroethenes, total	<	5	ug/kg
Chloroform	(3.4)*	5	ug/kg
1,2-Dichloroethane	47	5	ug/kg
2-Butanone	(3.2)*	100	ug/kg
1,1,1-Trichloroethane	130	5	ug/kg
Carbon Tetrachloride	<	5	ug/kg
Vinyl Acetate	<	50	ug/kg
Bromodichloromethane	<	5	ug/kg
1,2-Dichloropropane	<	5	ug/kg
Trans-1,3-Dichloropropene	7.5	5	ug/kg
Trichloroethene	36	5	ug/kg
Dibromochloromethane	<	5	ug/kg
1,1,2-Trichloroethane	<	5	ug/kg
Benzene	23	5	ug/kg
Cis-1,3-Dichloropropene	<	5	ug/kg
2-Chloroethyl Vinyl Ether	<	10	ug/kg
Bromoform	<	5	ug/kg
4-Methyl-2-Pentanone	<	50	ug/kg
2-Hexanone	<	50	ug/kg
Tetrachloroethene	37	5	ug/kg
1,1,2,2-Tetrachloroethane	<	5	ug/kg
Toluene	26	5	ug/kg
Chlorobenzene	30	5	ug/kg
Ethylbenzene	24	5	ug/kg
Styrene	9.0	5	ug/kg
Xylenes, total	18	5	ug/kg

Surrogate Recoveries		QC Limits
Toluene-d_8	99 %	79-122
4-Bromofluorobenzene	45 %	51-122
1,2-Dichloroethane-d_4	85 %	72-117

* Detected below reporting limit; quantitation may be unreliable.
< = Compound not detected at or above the listed reporting limit.

Semivolatile Organic Compounds - EPA Method 8270

Client: Soil Tech
Client Sample ID: 18.2-46532-32H
VISTA Sample ID: 935754-002 Sample Type: Soil
Date Sampled : 01/13/93 Date Received: 01/13/93
Date Extracted: 01/14/93 Date Analyzed: 01/26/93

Analyte	Result	Reporting Limit	Units
Phenol	<	330	ug/kg
Bis(2-Chloroethyl) Ether	<	330	ug/kg
2-Chlorophenol	<	330	ug/kg
1,3-Dichlorobenzene	<	330	ug/kg
1,4-Dichlorobenzene	<	330	ug/kg
Benzyl Alcohol	<	660	ug/kg
1,2-Dichlorobenzene	<	330	ug/kg
2-Methylphenol	<	330	ug/kg
Bis(2-Chloroisopropyl) Ether	<	330	ug/kg
4-Methylphenol	<	330	ug/kg
N-Nitroso-di-n-propylamine	<	330	ug/kg
Hexachloroethane	<	330	ug/kg
Nitrobenzene	<	330	ug/kg
Isophorone	<	330	ug/kg
2-Nitrophenol	<	330	ug/kg
2,4-Dimethylphenol	<	330	ug/kg
Benzoic Acid	<	1,700	ug/kg
Bis(2-Chloroethoxy)methane	<	330	ug/kg
2,4-Dichlorophenol	<	330	ug/kg
1,2,4-Trichlorobenzene	<	330	ug/kg
Naphthalene	<	330	ug/kg
4-Chloroaniline	<	660	ug/kg
Hexachlorobutadiene	<	330	ug/kg
4-Chloro-3-methylphenol	<	660	ug/kg
2-Methylnaphthalene	<	330	ug/kg
Hexachlorocyclopentadiene	<	330	ug/kg
2,4,6-Trichlorophenol	<	330	ug/kg
2,4,5-Trichlorophenol	<	330	ug/kg
2-Chloronaphthalene	<	330	ug/kg
2-Nitroaniline	<	1,700	ug/kg
Dimethyl Phthalate	<	330	ug/kg
Acenaphthylene	<	330	ug/kg
3-Nitroaniline	<	1,700	ug/kg
Acenaphthene	<	330	ug/kg
2,4-Dinitrophenol	<	1,700	ug/kg
4-Nitrophenol	<	1,700	ug/kg
Dibenzofuran	<	330	ug/kg

< = Compound not detected at or above the listed reporting limit.

Semivolatile Organic Compounds - EPA Method 8270 (continued)

VISTA Sample ID: 935754-002

Analyte	Result	Reporting Limit	Units
2,4-Dinitrotoluene	<	330	ug/kg
2,6-Dinitrotoluene	<	330	ug/kg
Diethyl Phthalate	<	330	ug/kg
4-Chlorophenyl Phenyl Ether	<	330	ug/kg
Fluorene	<	330	ug/kg
4-Nitroaniline	<	1,700	ug/kg
4,6-Dinitro-2-methylphenol	<	1,700	ug/kg
N-Nitrosodiphenylamine	<	330	ug/kg
4-Bromophenyl Phenyl Ether	<	330	ug/kg
Hexachlorobenzene	<	330	ug/kg
Pentachlorophenol	<	1,700	ug/kg
Phenanthrene	<	330	ug/kg
Anthracene	<	330	ug/kg
Di-n-butyl Phthalate	<	330	ug/kg
Fluoranthene	<	330	ug/kg
Pyrene	<	330	ug/kg
Butylbenzyl Phthalate	<	330	ug/kg
3,3'-Dichlorobenzidine	<	660	ug/kg
Benzo(a)anthracene	<	330	ug/kg
Bis(2-Ethylhexyl) Phthalate	<	330	ug/kg
Chrysene	<	330	ug/kg
Di-n-octyl Phthalate	<	330	ug/kg
Benzo(b)fluoranthene	<	330	ug/kg
Benzo(k)fluoranthene	<	330	ug/kg
Benzo(a)pyrene	<	330	ug/kg
Indeno(1,2,3-cd)pyrene	<	330	ug/kg
Dibenz(a,h)anthracene	<	330	ug/kg
Benzo(g,h,i)perylene	<	330	ug/kg

Surrogate Recoveries			QC Limits
Nitrobenzene-d_5	100	%	35-93
2-Fluorobiphenyl	121	%	27-99
Terphenyl-d_{14}	120	%	57-109
Phenol-d_6	89	%	26-103
2-Fluorophenol	62	%	16-97
2,4,6-Tribromophenol	67	%	10-131

< = Compound not detected at or above the listed reporting limit.

Total Recoverable Petroleum Hydrocarbons
EPA Method 418.1

Client: Soil Tech
Client Sample ID: 18.3-46532-2-S2L
VISTA Sample ID: 935754-003 Sample Type: Soil
Date Sampled : 01/13/93 Date Received: 01/13/93
Date Extracted: 01/18/93 Date Analyzed: 01/18/93

Analyte	Result	Reporting Limit	Units
TRPH	<	40	mg/kg

< = Compound not detected at or above the listed reporting limit.

Polychlorinated Biphenyls
EPA Method 8080

Client: Soil Tech
Client Sample ID: 18.3-46532-2-S2L
VISTA Sample ID: 935754-003 Sample Type: Soil
Date Sampled : 01/13/93 Date Received: 01/13/93
Date Extracted: 01/21/93 Date Analyzed: 01/25/93

Analyte	Result	Reporting Limit	Units
PCB-1016	<	3	mg/kg
PCB-1221	<	3	mg/kg
PCB-1232	<	2	mg/kg
PCB-1242	<	1	mg/kg
PCB-1248	<	1	mg/kg
PCB-1254	<	1	mg/kg
PCB-1260	<	1	mg/kg

Surrogate Recoveries		QC Limits
Dibutyl Chlorendate (DBC)	94 %	24-154

< Compound not detected at or above the listed reporting limit.

Volatile Organic Compounds - EPA Method 8240

Client: Soil Tech
Client Sample ID: 18.3-46500-2-S2L
VISTA Sample ID: 935754-003 Sample Type: Soil
Date Sampled : 01/13/93 Date Received: 01/13/93
Date Analyzed: 01/26/93

Analyte	Result	Reporting Limit	Units
Chloromethane	11	10	ug/kg
Bromomethane	<	10	ug/kg
Vinyl Chloride	<	10	ug/kg
Chloroethane	<	10	ug/kg
Methylene Chloride	290	5	ug/kg
Acetone	190	100	ug/kg
Carbon Disulfide	18	5	ug/kg
1,1-Dichloroethene	6.4	5	ug/kg
1,1-Dichloroethane	<	5	ug/kg
1,2-Dichloroethenes, total	(3.5)*	5	ug/kg
Chloroform	(3.6)*	5	ug/kg
1,2-Dichloroethane	8.4	5	ug/kg
2-Butanone	<	100	ug/kg
1,1,1-Trichloroethane	44	5	ug/kg
Carbon Tetrachloride	<	5	ug/kg
Vinyl Acetate	<	50	ug/kg
Bromodichloromethane	<	5	ug/kg
1,2-Dichloropropane	<	5	ug/kg
Trans-1,3-Dichloropropene	<	5	ug/kg
Trichloroethene	30	5	ug/kg
Dibromochloromethane	<	5	ug/kg
1,1,2-Trichloroethane	<	5	ug/kg
Benzene	23	5	ug/kg
Cis-1,3-Dichloropropene	<	5	ug/kg
2-Chloroethyl Vinyl Ether	<	10	ug/kg
Bromoform	<	5	ug/kg
4-Methyl-2-Pentanone	<	50	ug/kg
2-Hexanone	<	50	ug/kg
Tetrachloroethene	48	5	ug/kg
1,1,2,2-Tetrachloroethane	<	5	ug/kg
Toluene	34	5	ug/kg
Chlorobenzene	26	5	ug/kg
Ethylbenzene	27	5	ug/kg
Styrene	14	5	ug/kg
Xylenes, total	<	5	ug/kg

Surrogate Recoveries		QC Limits
Toluene-d_8	101 %	79-122
4-Bromofluorobenzene	93 %	61-122
1,2-Dichloroethane-d_4	88 %	78-117

* Detected below reporting limit; quantitation may be unreliable.
< Compound not detected at or above the listed reporting limit.

Semivolatile Organic Compounds - EPA Method 8270

Client: Soil Tech
Client Sample ID: 18.3-46532-2-S2L
VISTA Sample ID: 935754-003 Sample Type: Soil
Date Sampled : 01/13/93 Date Received: 01/13/93
Date Extracted: 01/14/93 Date Analyzed: 01/26/93

Analyte	Result	Reporting Limit	Units
Phenol	<	330	ug/kg
Bis(2-Chloroethyl) Ether	<	330	ug/kg
2-Chlorophenol	<	330	ug/kg
1,3-Dichlorobenzene	<	330	ug/kg
1,4-Dichlorobenzene	<	330	ug/kg
Benzyl Alcohol	<	660	ug/kg
1,2-Dichlorobenzene	<	330	ug/kg
2-Methylphenol	<	330	ug/kg
Bis(2-Chloroisopropyl) Ether	<	330	ug/kg
4-Methylphenol	<	330	ug/kg
N-Nitroso-di-n-propylamine	<	330	ug/kg
Hexachloroethane	<	330	ug/kg
Nitrobenzene	<	330	ug/kg
Isophorone	<	330	ug/kg
2-Nitrophenol	<	330	ug/kg
2,4-Dimethylphenol	<	330	ug/kg
Benzoic Acid	<	1,700	ug/kg
Bis(2-Chloroethoxy)methane	<	330	ug/kg
2,4-Dichlorophenol	<	330	ug/kg
1,2,4-Trichlorobenzene	<	330	ug/kg
Naphthalene	<	330	ug/kg
4-Chloroaniline	<	660	ug/kg
Hexachlorobutadiene	<	330	ug/kg
4-Chloro-3-methylphenol	<	660	ug/kg
2-Methylnaphthalene	<	330	ug/kg
Hexachlorocyclopentadiene	<	330	ug/kg
2,4,6-Trichlorophenol	<	330	ug/kg
2,4,5-Trichlorophenol	<	330	ug/kg
2-Chloronaphthalene	<	330	ug/kg
2-Nitroaniline	<	1,700	ug/kg
Dimethyl Phthalate	<	330	ug/kg
Acenaphthylene	<	330	ug/kg
3-Nitroaniline	<	1,700	ug/kg
Acenaphthene	<	330	ug/kg
2,4-Dinitrophenol	<	1,700	ug/kg
4-Nitrophenol	<	1,700	ug/kg
Dibenzofuran		330	ug/kg

< Compound not detected at or above the listed reporting limit.

Semivolatile Organic Compounds - EPA Method 8270
(continued)

VISTA Sample ID: 935754-003

Analyte	Result	Reporting Limit	Units
2,4-Dinitrotoluene	<	330	ug/kg
2,6-Dinitrotoluene	<	330	ug/kg
Diethyl Phthalate	<	330	ug/kg
4-Chlorophenyl Phenyl Ether	<	330	ug/kg
Fluorene	<	330	ug/kg
4-Nitroaniline	<	1,700	ug/kg
4,6-Dinitro-2-methylphenol	<	1,700	ug/kg
N-Nitrosodiphenylamine	<	330	ug/kg
4-Bromophenyl Phenyl Ether	<	330	ug/kg
Hexachlorobenzene	<	330	ug/kg
Pentachlorophenol	<	1,700	ug/kg
Phenanthrene	<	330	ug/kg
Anthracene	<	330	ug/kg
Di-n-butyl Phthalate	<	330	ug/kg
Fluoranthene	<	330	ug/kg
Pyrene	<	330	ug/kg
Butylbenzyl Phthalate	<	330	ug/kg
3,3'-Dichlorobenzidine	<	660	ug/kg
Benzo(a)anthracene	<	330	ug/kg
Bis(2-Ethylhexyl) Phthalate	<	330	ug/kg
Chrysene	<	330	ug/kg
Di-n-octyl Phthalate	<	330	ug/kg
Benzo(b)fluoranthene	<	330	ug/kg
Benzo(k)fluoranthene	<	330	ug/kg
Benzo(a)pyrene	<	330	ug/kg
Indeno(1,2,3-cd)pyrene	<	330	ug/kg
Dibenz(a,h)anthracene	<	330	ug/kg
Benzo(g,h,i)perylene	<	330	ug/kg

Surrogate Recoveries		QC Limits
Nitrobenzene-d_5	77 %	35-90
2-Fluorobiphenyl	100 %	27-99
Terphenyl-d_{14}	112 %	57-109
Phenol-d_6	75 %	26-103
2-Fluorophenol	61 %	16-97
2,4,6-Tribromophenol	44 %	10-121

< = Compound not detected at or above the listed reporting limit.

Simulated Distillation/Total Petroleum Hydrocarbons
GC/FID - ASTM D2887/CDHS Method

Client: Soil Tech
Client Sample ID: 18.23-46532-2-L1(O)
VISTA Sample ID: 935754-004* Sample Type: Waste
Date Sampled : 01/13/93 Date Received: 01/13/93
Date Extracted: 01/15/93 Date Analyzed: 01/15/93

Hydrocarbon - Boiling Point		% Eluting
C_7	- 98°C	4 %
C_8	- 126°C	19 %
C_9	- 151°C	52 %
C_{10}	- 174°C	68 %
C_{11}	- 196°C	80 %
C_{12}	- 216°C	87 %
C_{14}	- 254°C	92 %
C_{16}	- 287°C	94 %
C_{18}	- 316°C	95 %
C_{20}	- 344°C	96 %
C_{24}	- 391°C	98 %
C_{28}	- 431°C	99 %
C_{32}	- 466°C	99 %
C_{36}	- 496°C	100 %
C_{40}	- 522°C	100 %
C_{44}	- 545°C	100 %

	Result	Reporting Limit	Units
Total Petroleum Hydrocarbons	<	0.5	mg/L

* Lower Phase
< = Compound not detected at or above the listed reporting limit.

Polychlorinated Biphenyls
EPA Method 8080

Client: Soil Tech
Client Sample ID: 18.23-46532-2-L1(W)
VISTA Sample ID: 935754-004* Sample Type: Waste
Date Sampled : 01/13/93 Date Received: 01/13/93
Date Extracted: 01/21/93 Date Analyzed: 01/26/93

Analyte	Result	Reporting Limit	Units
PCB-1016	<	300	mg/kg
PCB-1221	<	300	mg/kg
PCB-1232	<	200	mg/kg
PCB-1242	<	100	mg/kg
PCB-1248	3,700	100	mg/kg
PCB-1254	1,200	100	mg/kg
PCB-1260	<	100	mg/kg

Surrogate Recoveries		QC Limits
Dibutyl Chlorendate (DBC)	D	24-154

* Upper Phase
D = Diluted Out
< = Compound not detected at or above the listed reporting limit.

Polychlorinated Biphenyls
EPA Method 8080

Client: Soil Tech
Client Sample ID: 18.23-46532-2-L1(C)
VISTA Sample ID: 935754-004* Sample Type: Waste
Date Sampled : 01/13/93 Date Received: 01/13/93
Date Extracted: 01/21/93 Date Analyzed: 01/26/93

Analyte	Result	Reporting Limit	Units
PCB-1016	<	3	mg/kg
PCB-1221	<	3	mg/kg
PCB-1232	<	2	mg/kg
PCB-1242	<	1	mg/kg
PCB-1248	<	1	mg/kg
PCB-1254	<	1	mg/kg
PCB-1260	<	1	mg/kg

Surrogate Recoveries		QC Limits
Dibutyl Chlorendate (DBC)	97	24-154

* Lower Phase
< = Compound not detected at or above the listed reporting limit.

Volatile Organic Compounds - EPA Method 8240

Client: Soil Tech
Client Sample ID: 18.23-46532-2-L1(W)
VISTA Sample ID: 935754-004* Sample Type: Waste
Date Sampled : 01/13/93 Date Received: 01/13/93
Date Analyzed: 01/26/93

Analyte	Result	Reporting Limit	Units
Chloromethane	<	1,000	mg/kg
Bromomethane	<	1,000	mg/kg
Vinyl Chloride	<	1,000	mg/kg
Chloroethane	<	1,000	mg/kg
Methylene Chloride	16,000	500	mg/kg
Acetone	(910)**	10,000	mg/kg
Carbon Disulfide	<	500	mg/kg
1,1-Dichloroethene	710	500	mg/kg
1,1-Dichloroethane	1,400	500	mg/kg
1,2-Dichloroethenes, total	(140)**	500	mg/kg
Chloroform	<	500	mg/kg
1,2-Dichloroethane	67,000	500	mg/kg
2-Butanone	(3,600)**	10,000	mg/kg
1,1,1-Trichloroethane	8,000	500	mg/kg
Carbon Tetrachloride	<	500	mg/kg
Vinyl Acetate	<	5,000	mg/kg
Bromodichloromethane	<	500	mg/kg
1,2-Dichloropropane	<	500	mg/kg
Trans-1,3-Dichloropropene	<	500	mg/kg
Trichloroethene	95,000	500	mg/kg
Dibromochloromethane	<	500	mg/kg
1,1,2-Trichloroethane	<	500	mg/kg
Benzene	10,000	500	mg/kg
Cis-1,3-Dichloropropene	<	500	mg/kg
2-Chloroethyl Vinyl Ether	<	1,000	mg/kg
Bromoform	<	500	mg/kg
4-Methyl-2-Pentanone	11,000	5,000	mg/kg
2-Hexanone	<	5,000	mg/kg
Tetrachloroethene	26,000	500	mg/kg
1,1,2,2-Tetrachloroethane	<	500	mg/kg
Toluene	54,000	500	mg/kg
Chlorobenzene	<	500	mg/kg
Ethylbenzene	18,000	500	mg/kg
Styrene	11,000	500	mg/kg
Xylenes, total	87,000	500	mg/kg

Surrogate Recoveries		QC Limits
Toluene-d_8	104 %	66-103
4-Bromofluorobenzene	85 %	66-104
1,2-Dichloroethane-d_4	94 %	69-107

* Upper Phase
** Detected below reporting limit; quantitation may be unreliable.
< = Compound not detected at or above the listed reporting limit.

Volatile Organic Compounds - EPA Method 8240

Client: Soil Tech
Client Sample ID: 18.23-46532-2-L1(O)
VISTA Sample ID: 935754-004* Sample Type: Waste
Date Sampled : 01/13/93 Date Received: 01/13/93
Date Analyzed: 01/27/93

Analyte	Result	Reporting Limit	Units
Chloromethane	<	1,000	mg/kg
Bromomethane	<	1,000	mg/kg
Vinyl Chloride	<	1,000	mg/kg
Chloroethane	<	1,000	mg/kg
Methylene Chloride	810	500	mg/kg
Acetone	(1,300)**	10,000	mg/kg
Carbon Disulfide	<	500	mg/kg
1,1-Dichloroethene	(290)**	500	mg/kg
1,1-Dichloroethane	(120)**	500	mg/kg
1,2-Dichloroethenes, total	(120)**	500	mg/kg
Chloroform	(150)**	500	mg/kg
1,2-Dichloroethane	1,700	500	mg/kg
2-Butanone	(3,300)**	10,000	mg/kg
1,1,1-Trichloroethane	10,000	500	mg/kg
Carbon Tetrachloride	<	500	mg/kg
Vinyl Acetate	<	5,000	mg/kg
Bromodichloromethane	(160)**	500	mg/kg
1,2-Dichloropropane	(190)**	500	mg/kg
Trans-1,3-Dichloropropene	(180)**	500	mg/kg
Trichloroethene	1,200	500	mg/kg
Dibromochloromethane	(160)**	500	mg/kg
1,1,2-Trichloroethane	(220)**	500	mg/kg
Benzene	640	500	mg/kg
Cis-1,3-Dichloropropene	(170)**	500	mg/kg
2-Chloroethyl Vinyl Ether	(170)**	1,000	mg/kg
Bromoform	(130)**	500	mg/kg
4-Methyl-2-Pentanone	(1,000)**	5,000	mg/kg
2-Hexanone	<	5,000	mg/kg
Tetrachloroethene	670	500	mg/kg
1,1,2,2-Tetrachloroethane	(360)**	500	mg/kg
Toluene	1,300	500	mg/kg
Chlorobenzene	<	500	mg/kg
Ethylbenzene	720	500	mg/kg
Styrene	550	500	mg/kg
Xylenes, total	1,900	500	mg/kg

Surrogate Recoveries		QC Limits
Toluene-d_8	110	66-130
4-Bromofluorobenzene	76	66-134
1,2-Dichloroethane-d_4	96	59-127

* Lower Phase
** Detected below reporting limit; quantitation may be unreliable.
< = Compound not detected at or above the listed reporting limit.

Semivolatile Organic Compounds - EPA Method 8270

Client: Soil Tech
Client Sample ID: 18.23-46532-2-11(W)
VISTA Sample ID: 935754-004* Sample Type: Waste
Date Sampled : 01/13/93 Date Received: 01/13/93
Date Extracted: 01/14/93 Date Analyzed: 01/26/93

Analyte	Result	Reporting Limit	Units
Phenol	7,800	100	mg/kg
Bis(2-Chloroethyl) Ether	<	100	mg/kg
2-Chlorophenol	<	100	mg/kg
1,3-Dichlorobenzene	<	100	mg/kg
1,4-Dichlorobenzene	<	100	mg/kg
Benzyl Alcohol	<	200	mg/kg
1,2-Dichlorobenzene	200	100	mg/kg
2-Methylphenol	1,400	100	mg/kg
Bis(2-Chloroisopropyl) Ether	<	100	mg/kg
4-Methylphenol	1,000	100	mg/kg
N-Nitroso-di-n-propylamine	<	100	mg/kg
Hexachloroethane	<	100	mg/kg
Nitrobenzene	<	100	mg/kg
Isophorone	3,300	100	mg/kg
2-Nitrophenol	<	100	mg/kg
2,4-Dimethylphenol	1,100	100	mg/kg
Benzoic Acid	4,000	500	mg/kg
Bis(2-Chloroethoxy)methane	<	100	mg/kg
2,4-Dichlorophenol	<	100	mg/kg
1,2,4-Trichlorobenzene	<	100	mg/kg
Naphthalene	5,200	100	mg/kg
4-Chloroaniline	1,600	200	mg/kg
Hexachlorobutadiene	1,300	100	mg/kg
4-Chloro-3-methylphenol	<	200	mg/kg
2-Methylnaphthalene	1,300	100	mg/kg
Hexachlorocyclopentadiene	1,400	100	mg/kg
2,4,6-Trichlorophenol	<	100	mg/kg
2,4,5-Trichlorophenol	<	100	mg/kg
2-Chloronaphthalene	<	100	mg/kg
2-Nitroaniline	<	500	mg/kg
Dimethyl Phthalate	130	100	mg/kg
Acenaphthylene	<	100	mg/kg
3-Nitroaniline	<	500	mg/kg
Acenaphthene	(80)**	100	mg/kg
2,4-Dinitrophenol	<	500	mg/kg
4-Nitrophenol	<	500	mg/kg
Dibenzofuran	(40)**	100	mg/kg

* Upper Phase
** Detected below reporting limit; quantitation may be unreliable.
< = Compound not detected at or above the listed reporting limit.

Semivolatile Organic Compounds - EPA Method 8270
Continued

VISTA Sample ID: 935754-004*

Analyte	Result	Reporting Limit	Units
2,4-Dinitrotoluene	<	100	mg/kg
2,6-Dinitrotoluene	<	100	mg/kg
Diethyl Phthalate	<	100	mg/kg
4-Chlorophenyl Phenyl Ether	<	100	mg/kg
Fluorene	120	100	mg/kg
4-Nitroaniline	<	500	mg/kg
4,6-Dinitro-2-methylphenol	<	500	mg/kg
N-Nitrosodiphenylamine	<	100	mg/kg
4-Bromophenyl Phenyl Ether	<	100	mg/kg
Hexachlorobenzene	(67)**	100	mg/kg
Pentachlorophenol	<	500	mg/kg
Phenanthrene	150	100	mg/kg
Anthracene	(52)**	100	mg/kg
Di-n-butyl Phthalate	570	100	mg/kg
Fluoranthene	<	100	mg/kg
Pyrene	(44)**	100	mg/kg
Butylbenzyl Phthalate	240	100	mg/kg
3,3'-Dichlorobenzidine	<	200	mg/kg
Benzo(a)anthracene	(18)**	100	mg/kg
Bis(2-Ethylhexyl) Phthalate	1,100	100	mg/kg
Chrysene	(22)**	100	mg/kg
Di-n-octyl Phthalate	(16)**	100	mg/kg
Benzo(b)fluoranthene	(17)**	100	mg/kg
Benzo(k)fluoranthene	<	100	mg/kg
Benzo(a)pyrene	<	100	mg/kg
Indeno(1,2,3-cd)pyrene	<	100	mg/kg
Dibenz(a,h)anthracene	<	100	mg/kg
Benzo(g,h,i)perylene	<	100	mg/kg

Surrogate Recoveries		QC Limits
Nitrobenzene-d_5	267 %	32-118
2-Fluorobiphenyl	97 %	27-114
Terphenyl-d_{14}	97 %	44-131
Phenol-d_6	175 %	22-121
2-Fluorophenol	45 %	10-141
2,4,6-Tribromophenol	80 %	15-126

* Upper Phase
** Detected below reporting limit; quantitation may be unreliable.
< = Compound not detected at or above the listed reporting limit.

Semivolatile Organic Compounds - EPA Method 8270

Client: Soil Tech
Client Sample ID: 18.23-46532-2-L1(O)
VISTA Sample ID: 935754-004* Sample Type: Waste
Date Sampled : 01/13/93 Date Received: 01/13/93
Date Extracted: 01/14/93 Date Analyzed: 01/26/93

Analyte	Result	Reporting Limit	Units
Phenol	1,300	100	mg/kg
Bis(2-Chloroethyl) Ether	<	100	mg/kg
2-Chlorophenol	<	100	mg/kg
1,3-Dichlorobenzene	<	100	mg/kg
1,4-Dichlorobenzene	<	100	mg/kg
Benzyl Alcohol	(68)**	200	mg/kg
1,2-Dichlorobenzene	<	100	mg/kg
2-Methylphenol	(36)**	100	mg/kg
Bis(2-Chloroisopropyl) Ether	<	100	mg/kg
4-Methylphenol	(33)**	100	mg/kg
N-Nitroso-di-n-propylamine	<	100	mg/kg
Hexachloroethane	<	100	mg/kg
Nitrobenzene	<	100	mg/kg
Isophorone	(27)**	100	mg/kg
2-Nitrophenol	<	100	mg/kg
2,4-Dimethylphenol	<	100	mg/kg
Benzoic Acid	(170)**	500	mg/kg
Bis(2-Chloroethoxy)methane	<	100	mg/kg
2,4-Dichlorophenol	<	100	mg/kg
1,2,4-Trichlorobenzene	<	100	mg/kg
Naphthalene	<	100	mg/kg
4-Chloroaniline	<	200	mg/kg
Hexachlorobutadiene	<	100	mg/kg
4-Chloro-3-methylphenol	<	200	mg/kg
2-Methylnaphthalene	<	100	mg/kg
Hexachlorocyclopentadiene	<	100	mg/kg
2,4,6-Trichlorophenol	<	100	mg/kg
2,4,5-Trichlorophenol	<	100	mg/kg
2-Chloronaphthalene	<	100	mg/kg
2-Nitroaniline	<	500	mg/kg
Dimethyl Phthalate	<	100	mg/kg
Acenaphthylene	<	100	mg/kg
3-Nitroaniline	<	500	mg/kg
Acenaphthene	<	100	mg/kg
2,4-Dinitrophenol	<	500	mg/kg
4-Nitrophenol	<	500	mg/kg
Dibenzofuran	<	100	mg/kg

* Lower Phase
** Detected below reporting limit; quantitation may be unreliable.
< = Compound not detected at or above the listed reporting limit.

Semivolatile Organic Compounds - EPA Method 8270
(continued)

VISTA Sample ID: 935754-004*

Analyte	Result	Reporting Limit	Units
2,4-Dinitrotoluene	<	100	mg/kg
2,6-Dinitrotoluene	<	100	mg/kg
Diethyl Phthalate	<	100	mg/kg
4-Chlorophenyl Phenyl Ether	<	100	mg/kg
Fluorene	<	100	mg/kg
4-Nitroaniline	<	500	mg/kg
4,6-Dinitro-2-methylphenol	<	500	mg/kg
N-Nitrosodiphenylamine	<	100	mg/kg
4-Bromophenyl Phenyl Ether	<	100	mg/kg
Hexachlorobenzene	<	100	mg/kg
Pentachlorophenol	<	500	mg/kg
Phenanthrene	<	100	mg/kg
Anthracene	<	100	mg/kg
Di-n-butyl Phthalate	<	100	mg/kg
Fluoranthene	<	100	mg/kg
Pyrene	<	100	mg/kg
Butylbenzyl Phthalate	<	100	mg/kg
3,3'-Dichlorobenzidine	<	200	mg/kg
Benzo(a)anthracene	<	100	mg/kg
Bis(2-Ethylhexyl) Phthalate	<	100	mg/kg
Chrysene	<	100	mg/kg
Di-n-octyl Phthalate	<	100	mg/kg
Benzo(b)fluoranthene	<	100	mg/kg
Benzo(k)fluoranthene	<	100	mg/kg
Benzo(a)pyrene	<	100	mg/kg
Indeno(1,2,3-cd)pyrene	<	100	mg/kg
Dibenz(a,h)anthracene	<	100	mg/kg
Benzo(g,h,i)perylene	<	100	mg/kg

Surrogate Recoveries		QC Limits
Nitrobenzene-d_5	87 %	32-118
2-Fluorobiphenyl	105 %	27-114
Terphenyl-d_{14}	106 %	44-131
Phenol-d_6	89 %	32-121
2-Fluorophenol	86 %	10-141
2,4,6-Tribromophenol	90 %	15-126

* Lower Phase
< = Compound not detected at or above the listed reporting limit.

QUALITY ASSURANCE

Total Recoverable Petroleum Hydrocarbons
EPA Method 418.1

Client: Soil Tech
Client Sample ID: NA
VISTA Sample ID: 935754-Blank
Date Sampled : NA
Date Extracted: 01/18/93

Sample Type: Soil
Date Received: NA
Date Analyzed: 01/18/93

Analyte	Result	Reporting Limit	Unit
TRPH	<	40	mg/kg

NA = Not Applicable
< = Compound not detected at or above the listed reporting limit.

Quality Assurance
Total Recoverable Petroleum Hydrocarbons - EPA Method 418.1
Matrix Spike Recovery and Precision

Client: Soil Tech
Client Sample ID: NA
VISTA Sample ID: 935754-BLSP
Date Sampled : NA
Date Extracted: 01/18/93

Sample Type: Soil
Date Received: NA
Date Analyzed: 01/18/93

Compound	Spike Added (mg/kg)	Sample Conc. (mg/kg)	MS Conc. (mg/kg)	MS % Rec	QC Limits % Rec
TRPH	250	ND	194	78	75-125

Compound	Spike Added (mg/kg)	MSD Conc. (mg/kg)	MSD % Rec	RPD	QC Limits RPD	QC Limits % Rec
TRPH	250	194	78	0	15	75-125

NA = Not Applicable
ND = Not Detected
MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference

Polychlorinated Biphenyls
EPA Method 8080

Client: Soil Tech
Client Sample ID: NA
VISTA Sample ID: 935754-Blank
Sample Type: Soil
Date Sampled : NA
Date Received: NA
Date Extracted: 01/21/93
Date Analyzed: 01/22/93

Analyte	Result	Reporting Limit	Units
PCB-1016	<	3	mg/kg
PCB-1221	<	3	mg/kg
PCB-1232	<	2	mg/kg
PCB-1242	<	1	mg/kg
PCB-1248	<	1	mg/kg
PCB-1254	<	1	mg/kg
PCB-1260	<	1	mg/kg

Surrogate Recoveries		QC Limits
Dibutyl Chlorendate (DBC)	116	24-154

NA = Not Applicable
< = Compound not detected at or above the listed reporting limit.

Quality Assurance
Organochlorine Pesticides - Method 8080
Matrix Spike Recovery and Precision

Client: Soil Tech
Client Sample ID: NA
VISTA Sample ID: 935754-BLSP
Date Sampled : NA
Date Extracted: 01/21/93
Sample Type: Soil
Date Received: NA
Date Analyzed: 01/22/93

Compound	Spike Added (mg/kg)	Sample Conc. (mg/kg)	MS Conc. (mg/kg)	MS % Rec	QC Limits % Rec
gamma-BHC (Lindane)	0.2	ND	0.191	96	36-122
Heptachlor	0.2	ND	0.183	92	42-126
Aldrin	0.2	ND	0.154	77	39-117
Dieldrin	0.5	ND	0.472	94	43-105
Endrin	0.5	ND	0.469	94	35-136
4,4'-DDT	0.5	ND	0.371	74	22-146

Compound	Spike Added (mg/kg)	MSD Conc. (mg/kg)	MSD % Rec	RPD	QC Limits RPD	QC Limits % Rec
gamma-BHC (Lindane)	0.2	0.197	99	3	12	36-122
Heptachlor	0.2	0.186	93	1	13	42-126
Aldrin	0.2	0.158	79	3	12	39-117
Dieldrin	0.5	0.483	97	3	26	43-105
Endrin	0.5	0.478	96	2	22	35-136
4,4'-DDT	0.5	0.378	76	3	36	22-146

NA = Not Applicable
ND = Not Detected
MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference

Volatile Organic Compounds - EPA Method 8240

Client: Soil Tech
Client Sample ID: NA
VISTA Sample ID: 935754-Blank Sample Type: Water
Date Sampled : NA Date Received: NA
Date Analyzed: 01/26/93

Analyte	Result	Reporting Limit	Units
Chloromethane	<	10	ug/L
Bromomethane	<	10	ug/L
Vinyl Chloride	<	10	ug/L
Chloroethane	<	10	ug/L
Methylene Chloride	<	5	ug/L
Acetone	(4.6)*	100	ug/L
Carbon Disulfide	<	5	ug/L
1,1-Dichloroethene	<	5	ug/L
1,1-Dichloroethane	<	5	ug/L
1,2-Dichloroethenes, total	<	5	ug/L
Chloroform	<	5	ug/L
1,2-Dichloroethane	<	5	ug/L
2-Butanone	<	100	ug/L
1,1,1-Trichloroethane	<	5	ug/L
Carbon Tetrachloride	<	5	ug/L
Vinyl Acetate	<	50	ug/L
Bromodichloromethane	<	5	ug/L
1,2-Dichloropropane	<	5	ug/L
Trans-1,3-Dichloropropene	<	5	ug/L
Trichloroethene	<	5	ug/L
Dibromochloromethane	<	5	ug/L
1,1,2-Trichloroethane	<	5	ug/L
Benzene	<	5	ug/L
Cis-1,3-Dichloropropene	<	5	ug/L
2-Chloroethyl Vinyl Ether	<	10	ug/L
Bromoform	<	5	ug/L
4-Methyl-2-Pentanone	<	50	ug/L
2-Hexanone	<	50	ug/L
Tetrachloroethene	<	5	ug/L
1,1,2,2-Tetrachloroethane	<	5	ug/L
Toluene	<	5	ug/L
Chlorobenzene	<	5	ug/L
Ethylbenzene	<	5	ug/L
Styrene	<	5	ug/L
Xylenes, total	<	5	ug/L

Surrogate Recoveries		QC Limits
Toluene-d_8	99 %	81-117
4-Bromofluorobenzene	94 %	74-121
1,2-Dichloroethane-d_4	92 %	77-113

* Detected below reporting limit; quantitation may be unreliable.
NA = Not Applicable
< = Compound not detected at or above the listed reporting limit.

Volatile Organic Compounds - EPA Method 8240

Client: Soil Tech
Client Sample ID: NA
VISTA Sample ID: 935754-Blank Sample Type: Water
Date Sampled : NA Date Received: NA
Date Analyzed: 01/27/93

Analyte	Result	Reporting Limit	Units
Chloromethane	<	10	ug/L
Bromomethane	<	10	ug/L
Vinyl Chloride	<	10	ug/L
Chloroethane	<	10	ug/L
Methylene Chloride	<	5	ug/L
Acetone	(7.0)*	100	ug/L
Carbon Disulfide	<	5	ug/L
1,1-Dichloroethene	<	5	ug/L
1,1-Dichloroethane	<	5	ug/L
1,2-Dichloroethenes, total	<	5	ug/L
Chloroform	<	5	ug/L
1,2-Dichloroethane	<	5	ug/L
2-Butanone	<	100	ug/L
1,1,1-Trichloroethane	<	5	ug/L
Carbon Tetrachloride	<	5	ug/L
Vinyl Acetate	<	50	ug/L
Bromodichloromethane	<	5	ug/L
1,2-Dichloropropane	<	5	ug/L
Trans-1,3-Dichloropropene	<	5	ug/L
Trichloroethene	<	5	ug/L
Dibromochloromethane	<	5	ug/L
1,1,2-Trichloroethane	<	5	ug/L
Benzene	<	5	ug/L
Cis-1,3-Dichloropropene	<	5	ug/L
2-Chloroethyl Vinyl Ether	<	10	ug/L
Bromoform	<	5	ug/L
4-Methyl-2-Pentanone	<	50	ug/L
2-Hexanone	<	50	ug/L
Tetrachloroethene	<	5	ug/L
1,1,2,2-Tetrachloroethane	<	5	ug/L
Toluene	<	5	ug/L
Chlorobenzene	<	5	ug/L
Ethylbenzene	<	5	ug/L
Styrene	<	5	ug/L
Xylenes, total	<	5	ug/L

Surrogate Recoveries			QC Limits
Toluene-d_8	104	%	81-120
4-Bromofluorobenzene	94	%	74-121
1,2-Dichloroethane-d_4	95	%	76-114

NA = Not Applicable
* Detected below reporting limit; quantitation may be unreliable.
< = Compound not detected at or above the listed reporting limit.

Quality Assurance
Volatile Organics - EPA Method 8240
Matrix Spike Recovery and Precision

Client: Soil Tech
Client Sample ID: NA
VISTA Sample ID: 935754-BLSP
Date Sampled : NA
Date Analyzed: 01/26/93

Sample Type: Water
Date Received: NA

Compound	Spike Added (ug/L)	Sample Conc. (ug/L)	MS Conc. (ug/L)	MS % Rec	QC Limits % Rec
1,1-Dichloroethene	50	ND	45.4	91	60-113
Benzene	50	ND	50.2	100	88-111
Trichloroethene	50	ND	46.9	94	86-115
Toluene	50	ND	49.6	99	84-117
Chlorobenzene	50	ND	43.5	87	87-110

Compound	Spike Added (ug/L)	MSD Conc. (ug/L)	MSD % Rec	RPD	QC Limits RPD	QC Limits % Rec
1,1-Dichloroethene	50	42.8	86	6	14	60-113
Benzene	50	50.7	101	1	6	88-111
Trichloroethene	50	46.1	92	2	5	86-115
Toluene	50	49.5	99	0	7	84-117
Chlorobenzene	50	44.4	89	2	5	87-110

NA = Not Applicable
ND = Not Detected
MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference

Quality Assurance
Volatile Organics - EPA Method 8240
Matrix Spike Recovery and Precision

Client: Soil Tech
Client Sample ID: NA
VISTA Sample ID: 935754-BLSP
Sample Type: Water
Date Sampled : NA
Date Received: NA
Date Analyzed: 01/27/93

Compound	Spike Added (ug/L)	Sample Conc. (ug/L)	MS Conc. (ug/L)	MS % Rec	QC Limits % Rec
1,1-Dichloroethene	50	ND	50.3	101	60-113
Benzene	50	ND	54.7	109	88-111
Trichloroethene	50	ND	43.2	86	86-115
Toluene	50	ND	54.6	109	84-117
Chlorobenzene	50	ND	44.2	88	87-110

Compound	Spike Added (ug/L)	MSD Conc. (ug/L)	MSD % Rec	RPD	QC Limits RPD	QC Limits % Rec
1,1-Dichloroethene	50	51.9	104	3	10	60-113
Benzene	50	59.3	119	9	6	88-111
Trichloroethene	50	41.6	83	4	5	86-115
Toluene	50	55.8	112	3	7	84-117
Chlorobenzene	50	45.9	92	4	5	87-110

NA = Not Applicable
ND = Not Detected
MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference

Semivolatile Organic Compounds - EPA Method 8270

Client: Soil Tech
Client Sample ID: NA
VISTA Sample ID: 935754-Blank — Sample Type: Soil
Date Sampled : NA — Date Received: NA
Date Extracted: 01/14/93 — Date Analyzed: 01/26/93

Analyte	Result	Reporting Limit	Units
Phenol	<	330	ug/kg
Bis(2-Chloroethyl) Ether	<	330	ug/kg
2-Chlorophenol	<	330	ug/kg
1,3-Dichlorobenzene	<	330	ug/kg
1,4-Dichlorobenzene	<	330	ug/kg
Benzyl Alcohol	<	660	ug/kg
1,2-Dichlorobenzene	<	330	ug/kg
2-Methylphenol	<	330	ug/kg
Bis(2-Chloroisopropyl) Ether	<	330	ug/kg
4-Methylphenol	<	330	ug/kg
N-Nitroso-di-n-propylamine	<	330	ug/kg
Hexachloroethane	<	330	ug/kg
Nitrobenzene	<	330	ug/kg
Isophorone	<	330	ug/kg
2-Nitrophenol	<	330	ug/kg
2,4-Dimethylphenol	<	330	ug/kg
Benzoic Acid	<	1,700	ug/kg
Bis(2-Chloroethoxy)methane	<	330	ug/kg
2,4-Dichlorophenol	<	330	ug/kg
1,2,4-Trichlorobenzene	<	330	ug/kg
Naphthalene	<	330	ug/kg
4-Chloroaniline	<	660	ug/kg
Hexachlorobutadiene	<	330	ug/kg
4-Chloro-3-methylphenol	<	660	ug/kg
2-Methylnaphthalene	<	330	ug/kg
Hexachlorocyclopentadiene	<	330	ug/kg
2,4,6-Trichlorophenol	<	330	ug/kg
2,4,5-Trichlorophenol	<	330	ug/kg
2-Chloronaphthalene	<	330	ug/kg
2-Nitroaniline	<	1,700	ug/kg
Dimethyl Phthalate	<	330	ug/kg
Acenaphthylene	<	330	ug/kg
3-Nitroaniline	<	1,700	ug/kg
Acenaphthene	<	330	ug/kg
2,4-Dinitrophenol	<	1,700	ug/kg
4-Nitrophenol	<	1,700	ug/kg
Dibenzofuran	<	330	ug/kg

NA = Not Applicable
< = Compound not detected at or above the listed reporting limit.

Semivolatile Organic Compounds - EPA Method 8270
(continued)

VISTA Sample ID: 935754-Blank

Analyte	Result	Reporting Limit	Units
2,4-Dinitrotoluene	<	330	ug/kg
2,6-Dinitrotoluene	<	330	ug/kg
Diethyl Phthalate	<	330	ug/kg
4-Chlorophenyl Phenyl Ether	<	330	ug/kg
Fluorene	<	330	ug/kg
4-Nitroaniline	<	1,700	ug/kg
4,6-Dinitro-2-methylphenol	<	1,700	ug/kg
N-Nitrosodiphenylamine	<	330	ug/kg
4-Bromophenyl Phenyl Ether	<	330	ug/kg
Hexachlorobenzene	<	330	ug/kg
Pentachlorophenol	<	1,700	ug/kg
Phenanthrene	<	330	ug/kg
Anthracene	<	330	ug/kg
Di-n-butyl Phthalate	<	330	ug/kg
Fluoranthene	<	330	ug/kg
Pyrene	<	330	ug/kg
Butylbenzyl Phthalate	<	330	ug/kg
3,3'-Dichlorobenzidine	<	660	ug/kg
Benzo(a)anthracene	<	330	ug/kg
Bis(2-Ethylhexyl) Phthalate	<	330	ug/kg
Chrysene	<	330	ug/kg
Di-n-octyl Phthalate	<	330	ug/kg
Benzo(b)fluoranthene	<	330	ug/kg
Benzo(k)fluoranthene	<	330	ug/kg
Benzo(a)pyrene	<	330	ug/kg
Indeno(1,2,3-cd)pyrene	<	330	ug/kg
Dibenz(a,h)anthracene	<	330	ug/kg
Benzo(g,h,i)perylene	<	330	ug/kg

Surrogate Recoveries		QC Limits
Nitrobenzene-d_5	100 %	35-93
2-Fluorobiphenyl	105 %	27-99
Terphenyl-d_{14}	116 %	57-109
Phenol-d_6	100 %	26-102
2-Fluorophenol	91 %	16-97
2,4,6-Tribromophenol	100 %	10-131

< = Compound not detected at or above the listed reporting limit.

Semivolatile Organic Compounds - EPA Method 8270

Client: Soil Tech
Client Sample ID: NA
VISTA Sample ID: 935754-Blank
Sample Type: Waste
Date Sampled : NA
Date Received: 01/13/93
Date Extracted: 01/14/93
Date Analyzed: 01/26/93

Analyte	Result	Reporting Limit	Units
Phenol	<	100	mg/kg
Bis(2-Chloroethyl) Ether	<	100	mg/kg
2-Chlorophenol	<	100	mg/kg
1,3-Dichlorobenzene	<	100	mg/kg
1,4-Dichlorobenzene	<	100	mg/kg
Benzyl Alcohol	<	200	mg/kg
1,2-Dichlorobenzene	<	100	mg/kg
2-Methylphenol	<	100	mg/kg
Bis(2-Chloroisopropyl) Ether	<	100	mg/kg
4-Methylphenol	<	100	mg/kg
N-Nitroso-di-n-propylamine	<	100	mg/kg
Hexachloroethane	<	100	mg/kg
Nitrobenzene	<	100	mg/kg
Isophorone	<	100	mg/kg
2-Nitrophenol	<	100	mg/kg
2,4-Dimethylphenol	<	100	mg/kg
Benzoic Acid	<	500	mg/kg
Bis(2-Chloroethoxy)methane	<	100	mg/kg
2,4-Dichlorophenol	<	100	mg/kg
1,2,4-Trichlorobenzene	<	100	mg/kg
Naphthalene	<	100	mg/kg
4-Chloroaniline	<	200	mg/kg
Hexachlorobutadiene	<	100	mg/kg
4-Chloro-3-methylphenol	<	200	mg/kg
2-Methylnaphthalene	<	100	mg/kg
Hexachlorocyclopentadiene	<	100	mg/kg
2,4,6-Trichlorophenol	<	100	mg/kg
2,4,5-Trichlorophenol	<	100	mg/kg
2-Chloronaphthalene	<	100	mg/kg
2-Nitroaniline	<	500	mg/kg
Dimethyl Phthalate	<	100	mg/kg
Acenaphthylene	<	100	mg/kg
3-Nitroaniline	<	500	mg/kg
Acenaphthene	<	100	mg/kg
2,4-Dinitrophenol	<	500	mg/kg
4-Nitrophenol	<	500	mg/kg
Dibenzofuran	<	100	mg/kg

NA = Not Applicable
< = Compound not detected at or above the listed reporting limit.

Semivolatile Organic Compounds - EPA Method 8270
(continued)

VISTA Sample ID: 935754-Blank

Analyte	Result	Reporting Limit	Units
2,4-Dinitrotoluene	<	100	mg/kg
2,6-Dinitrotoluene	<	100	mg/kg
Diethyl Phthalate	<	100	mg/kg
4-Chlorophenyl Phenyl Ether	<	100	mg/kg
Fluorene	<	100	mg/kg
4-Nitroaniline	<	500	mg/kg
4,6-Dinitro-2-methylphenol	<	500	mg/kg
N-Nitrosodiphenylamine	<	100	mg/kg
4-Bromophenyl Phenyl Ether	<	100	mg/kg
Hexachlorobenzene	<	100	mg/kg
Pentachlorophenol	<	500	mg/kg
Phenanthrene	<	100	mg/kg
Anthracene	<	100	mg/kg
Di-n-butyl Phthalate	<	100	mg/kg
Fluoranthene	<	100	mg/kg
Pyrene	<	100	mg/kg
Butylbenzyl Phthalate	<	100	mg/kg
3,3'-Dichlorobenzidine	<	200	mg/kg
Benzo(a)anthracene	<	100	mg/kg
Bis(2-Ethylhexyl) Phthalate	<	100	mg/kg
Chrysene	<	100	mg/kg
Di-n-octyl Phthalate	<	100	mg/kg
Benzo(b)fluoranthene	<	100	mg/kg
Benzo(k)fluoranthene	<	100	mg/kg
Benzo(a)pyrene	<	100	mg/kg
Indeno(1,2,3-cd)pyrene	<	100	mg/kg
Dibenz(a,h)anthracene	<	100	mg/kg
Benzo(g,h,i)perylene	<	100	mg/kg

Surrogate Recoveries			QC Limits
Nitrobenzene-d_5	94	%	32-119
2-Fluorobiphenyl	107	%	27-114
Terphenyl-d_{14}	113	%	44-131
Phenol-d_6	92	%	32-121
2-Fluorophenol	91	%	10-141
2,4,6-Tribromophenol	90	%	18-126

< = Compound not detected at or above the listed reporting limit.

Quality Assurance
Semivolatile Organics - EPA Method 8270
Matrix Spike Recovery and Precision

Client: Soil Tech
Client Sample ID: NA
VISTA Sample ID: 935754-BLSP
Sample Type: Soil
Date Sampled : NA
Date Received: NA
Date Extracted: 01/14/93
Date Analyzed: 01/26/93

Compound	Spike Added (ug/kg)	Sample Conc. (ug/kg)	MS Conc. (ug/kg)	MS % Rec	QC Limits % Rec
Phenol	3330	ND	3800	114	20-96
2-Chlorophenol	3330	ND	3050	92	24-99
1,4-Dichlorobenzene	1670	ND	1330	80	28-95
Di-n-propylnitrosamine	1670	ND	1480	89	22-112
1,2,4-Trichlorobenzene	1670	ND	1200	72	23-115
4-Chloro-3-methylphenol	3330	ND	2740	82	21-117
Acenaphthene	1670	ND	1380	83	22-144
4-Nitrophenol	3330	ND	3010	90	10-126
2,4-Dinitrotoluene	1670	ND	1420	85	10-127
Pentachlorophenol	3330	ND	2860	86	10-132
Pyrene	1670	ND	1460	87	30-127

Compound	Spike Added (ug/kg)	MSD Conc. (ug/kg)	MSD % Rec	RPD	QC Limits RPD	QC Limits % Rec
Phenol	3330	4000	120	5	22	20-96
2-Chlorophenol	3330	3340	100	8	19	24-99
1,4-Dichlorobenzene	1670	1400	84	5	17	28-95
Di-n-propylnitrosamine	1670	1560	93	4	23	22-112
1,2,4-Trichlorobenzene	1670	1310	78	8	40	23-115
4-Chloro-3-methylphenol	3330	2970	89	8	30	21-117
Acenaphthene	1670	1470	88	6	19	22-144
4-Nitrophenol	3330	3360	101	12	39	10-126
2,4-Dinitrotoluene	1670	1590	95	11	28	10-127
Pentachlorophenol	3330	3240	97	12	47	10-132
Pyrene	1670	1580	95	9	31	30-127

NA = Not Applicable
ND = Not Detected
MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference

Quality Assurance
Semivolatile Organics - EPA Method 8270
Matrix Spike Recovery and Precision

Client: Soil Tech
Client Sample ID: NA
VISTA Sample ID: 935754-BLSP
Sample Type: Waste
Date Sampled : NA
Date Received: NA
Date Extracted: 01/14/93
Date Analyzed: 01/26/93

Compound	Spike Added (mg/kg)	Sample Conc. (mg/kg)	MS Conc. (mg/kg)	MS % Rec	QC Limits % Rec
Phenol	400	ND	469	117	26-90
2-Chlorophenol	400	ND	355	89	25-102
1,4-Dichlorobenzene	200	ND	188	94	28-104
Di-n-propylnitrosamine	200	ND	133	67	41-126
1,2,4-Trichlorobenzene	200	ND	173	87	38-107
4-Chloro-3-methylphenol	400	ND	319	80	26-103
Acenaphthene	200	ND	196	98	31-137
4-Nitrophenol	400	ND	248	62	11-114
2,4-Dinitrotoluene	200	ND	154	77	28-89
Pentachlorophenol	400	ND	297	74	17-109
Pyrene	200	ND	202	101	35-142

Compound	Spike Added (mg/kg)	MSD Conc. (mg/kg)	MSD % Rec	RPD	QC Limits RPD	QC Limits % Rec
Phenol	400	540	135	14	35	26-9[illegible]
2-Chlorophenol	400	439	110	21	50	25-1[illegible]
1,4-Dichlorobenzene	200	199	100	6	27	28-1[illegible]
Di-n-propylnitrosamine	200	184	92	31	38	41-1[illegible]
1,2,4-Trichlorobenzene	200	188	94	8	23	38-1[illegible]
4-Chloro-3-methylphenol	400	376	94	16	33	26-1[illegible]
Acenaphthene	200	209	105	7	19	31-1[illegible]
4-Nitrophenol	400	349	87	34	50	11-1[illegible]
2,4-Dinitrotoluene	200	188	94	20	47	28-8[illegible]
Pentachlorophenol	400	364	91	21	47	17-1[illegible]
Pyrene	200	215	108	7	36	35-1[illegible]

NA = Not Applicable
ND = Not Detected
MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference

Oil and Grease
Gravimetric - Modified EPA Method 9070

Client: Soil Tech
Client Sample ID: NA
VISTA Sample ID: 935754-Blank Sample Type: Soil
Date Sampled : NA Date Received: NA
Date Analyzed: 01/15/93

Analyte	Result	Reporting Limit	Units
Oil and Grease	<	50	mg/kg

NA = Not Applicable
< = Compound not detected at or above the listed reporting limit.

Quality Assurance
Oil and Grease - Modified EPA Method 9070
Matrix Spike Recovery and Precision

Client: Soil Tech
Client Sample ID: NA
VISTA Sample ID: 935754-BLSP
Date Sampled : NA
Date Analyzed: 01/15/93

Sample Type: Soil
Date Received: NA

Compound	Spike Added (mg/kg)	Sample Conc. (mg/kg)	MS Conc. (mg/kg)	MS % Rec	QC Limits % Rec
Oil and Grease (Motor Oil)	510	ND	533	105	35-141

Compound	Spike Added (mg/kg)	MSD Conc. (mg/kg)	MSD % Rec	RPD	QC Limits RPD	QC Limits % Rec
Oil and Grease (Motor Oil)	563	603	107	2	37	35-141

NA = Not Applicable
ND = Not Detected
MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference

HAZEN

HAZEN RESEARCH, INC.
4601 Indiana St. · Golden, CO 80403
Tel.: (303) 279-4501 · Telex 45-860

935754

To Vista 1-13-93

CHAIN OF CUSTODY RECORD

Proj No.	Project Name
7654-18	Sol Tech

Samplers (Signature)

Lab. No.	Date	Time	Comp.	Grab	Station Location	No. of Containers	TRPH	O&G 413.1	PCB	VOC TOC**	SVOC	Simulated Dist	Remarks
	1-13-93				18.1-46532-2-S1	1	X	X		X		X	separate condensate into oil and
					18.2-46532-2-S2H	1	X		X	X	X		water fractions before analysis
					18.3-46532-2-S2L	1	X		X	X	X		
					18.23-46532-2-L1	1							* take freon extract from the
					" -L1 (O)				X	X	X	X	oil & grease procedure (9071) and
					" -L1 (W)				X	X	X		do a simulated distillation on the
													liquid
													If there are any questions, please
													contact Roger Nielsen at x255.
													** TOC on solid samples
													only

Relinquished by (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
[signature] [illegible]	1-13-93 1430	[signature]		1-13-93/1700	
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received for laboratory by: (Signature)	Remarks:		

Distribution: White Copy - Ship With Sample; Canary Copy - Laboratory Copy; Pink Copy - [illegible]

VISTA
Laboratories Inc.

3335 [illegible]
Broomfield, Colorado 80021
(303) 469-8868

February 24, 1993

Mr. Roger Nielson
Soil Tech
6300 South Syracuse
#300
Englewood, Colorado 80111

Dear Mr. Nielson:

Enclosed are the results from the analyses of six soil samples and four waste samples, received on January 29, 1993, for the determination of total recoverable petroleum hydrocarbons, oil and grease, polychlorinated biphenyls, volatile organic compounds, semivolatile organic compounds and TOC. Please feel free to call if you have any questions regarding these analyses.

Sincerely,

Robert J. Keck
Laboratory Director

Reviewed by,

Gary Torf
Quality Assurance Director

RJK/GT/rt
Enclosures

VISTA Project # 935805

Sample Description

Laboratory ID	Client ID	Type	Date Received
935805-001	18.5-46532-3S-S1	Soil	01/29/93
935805-002	18.8-46532-4S-S1	Soil	01/29/93
935805-003	18.6-46532-3S-S2H	Soil	01/29/93
935805-004	18.7-46532-3S-S2L	Soil	01/29/93
935805-005	18.9-46532-4S-S2H	Soil	01/29/93
935805-006	18.10-46532-4S-S2L	Soil	01/29/93
935805-007L	18.67-46532-3S-L1(W)	Waste	01/29/93
935805-007U	18.67-46532-3S-L1(O)	Waste	01/29/93
935805-008L	18.910-46532-4S-L1(W)	Waste	01/29/93
935805-008U	18.910-46532-4S-L1(O)	Waste	01/29/93

Results and Discussion

VISTA Project # 935805

Six soil samples and four waste samples were received on January 29, 1993, for the determination of total recoverable petroleum hydrocarbons, oil and grease, polychlorinated biphenyls, volatile organic compounds, semivolatile organic compounds and TOC. The samples were analyzed according to the protocols described in USEPA SW-846, Test Methods for Evaluating Solid Waste, 3rd Ed and Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-02.

Quality Control (QC) results are reported for another client's samples which were prepared and analyzed with these samples. Sample information for the QC samples is withheld to maintain client confidentiality.

VISTA samples 935805-003, -004, -005 and -006 (your ID's 18.6-46532-3S-S2H, 18.7-46532-3S-S2L, 18.9-46532-4S-S2H and 18.10-46532-4S-S2L) were analyzed for TOC by Huffman Laboratories, Inc. Their report is enclosed.

Total Recoverable Petroleum Hydrocarbons
EPA Method 418.1

Client: Soil Tech
Client Sample ID: 18.5-46532-3S-S1
VISTA Sample ID: 935805-001 Sample Type: Soil
Date Sampled : 01/28/93 Date Received: 01/29/93
Date Extracted: 02/09/93 Date Analyzed: 02/09/93

Analyte	Result	Reporting Limit	Units
TRPH	7,700	400	mg/kg

Simulated Distillation/Total Petroleum Hydrocarbons
GC/FID - ASTM D2887/CDHS Method

Client: Soil Tech
Client Sample ID: 18.5-46532-3S-S1
VISTA Sample ID: 935805-001 Sample Type: Soil
Date Sampled : 01/28/93 Date Received: 01/29/93
Date Extracted: 02/08/93 Date Analyzed: 02/09/93

Hydrocarbon - Boiling Point		% Eluting
C_7	- 98°C	0 %
C_8	- 126°C	12 %
C_9	- 151°C	31 %
C_{10}	- 174°C	47 %
C_{11}	- 196°C	64 %
C_{12}	- 216°C	72 %
C_{14}	- 254°C	78 %
C_{16}	- 287°C	80 %
C_{18}	- 316°C	81 %
C_{20}	- 344°C	82 %
C_{24}	- 391°C	84 %
C_{28}	- 431°C	88 %
C_{32}	- 466°C	92 %
C_{36}	- 496°C	100 %
C_{40}	- 522°C	100 %
C_{44}	- 545°C	100 %

Oil and Grease
Gravimetric - Modified EPA Method 9070

Client: Soil Tech
Client Sample ID: 18.5-46532-3S-S1
VISTA Sample ID: 935805-001 Sample Type: Soil
Date Sampled : 01/28/93 Date Received: 01/29/93
Date Analyzed: 02/08/93

Analyte	Result	Reporting Limit	Units
Oil and Grease	4,700	50	mg/kg

Total Recoverable Petroleum Hydrocarbons
EPA Method 418.1

Client: Soil Tech
Client Sample ID: 18.8-46532-4S-S1
VISTA Sample ID: 935805-002 Sample Type: Soil
Date Sampled : 01/28/93 Date Received: 01/29/93
Date Extracted: 02/09/93 Date Analyzed: 02/09/93

Analyte	Result	Reporting Limit	Units
TRPH	29,000	4,000	mg/kg

Simulated Distillation/Total Petroleum Hydrocarbons
GC/FID - ASTM D2887/CDHS Method

Client: Soil Tech
Client Sample ID: 18.8-46532-4S-S1
VISTA Sample ID: 935805-002 Sample Type: Soil
Date Sampled : 01/28/93 Date Received: 01/29/93
Date Extracted: 02/08/93 Date Analyzed: 02/10/93

Hydrocarbon - Boiling Point		% Eluting
C_7	- 98°C	0 %
C_8	- 126°C	0 %
C_9	- 151°C	1 %
C_{10}	- 174°C	7 %
C_{11}	- 196°C	9 %
C_{12}	- 216°C	10 %
C_{14}	- 254°C	99 %
C_{16}	- 287°C	99 %
C_{18}	- 316°C	100 %
C_{20}	- 344°C	100 %
C_{24}	- 391°C	100 %
C_{28}	- 431°C	100 %
C_{32}	- 466°C	100 %
C_{36}	- 496°C	100 %
C_{40}	- 522°C	100 %
C_{44}	- 545°C	100 %

Oil and Grease
Gravimetric - Modified EPA Method 9070

Client: Soil Tech
Client Sample ID: 18.8-46532-4S-S1
VISTA Sample ID: 935805-002 Sample Type: Soil
Date Sampled : 01/28/93 Date Received: 01/29/93
Date Analyzed: 02/09/93

Analyte	Result	Reporting Limit	Units
Oil and Grease	400,000	50	mg/kg

Total Recoverable Petroleum Hydrocarbons
EPA Method 418.1

Client: Soil Tech
Client Sample ID: 18.6-46532-3S-S2H
VISTA Sample ID: 935805-003 Sample Type: Soil
Date Sampled : 01/28/93 Date Received: 01/29/93
Date Extracted: 02/09/93 Date Analyzed: 02/09/93

Analyte	Result	Reporting Limit	Units
TRPH	<	40	mg/kg

< - Compound not detected at or above the listed reporting limit.

Polychlorinated Biphenyls
EPA Method 8080

Client: Soil Tech
Client Sample ID: 18.6-46532-3S-S2H
VISTA Sample ID: 935805-003 Sample Type: Soil
Date Sampled : 01/28/93 Date Received: 01/29/93
Date Extracted: 02/03/93 Date Analyzed: 02/03/93

Analyte	Result	Reporting Limit	Units
PCB-1016	<	3	mg/kg
PCB-1221	<	3	mg/kg
PCB-1232	<	2	mg/kg
PCB-1242	<	1	mg/kg
PCB-1248	<	1	mg/kg
PCB-1254	<	1	mg/kg
PCB-1260	<	1	mg/kg

< = Compound not detected at or above the listed reporting limit.

Volatile Organic Compounds - EPA Method 8240

Client: Soil Tech
Client Sample ID: 18.6-46532-3S-S2H
VISTA Sample ID: 935805-003 Sample Type: Soil
Date Sampled : 01/28/93 Date Received: 01/29/93
Date Analyzed: 02/10/93

Analyte	Result	Reporting Limit	Units
Chloromethane	<	1,000	ug/kg
Bromomethane	<	1,000	ug/kg
Vinyl Chloride	<	1,000	ug/kg
Chloroethane	<	1,000	ug/kg
Methylene Chloride	(120)*	500	ug/kg
Acetone	(5,400)*	10,000	ug/kg
Carbon Disulfide	<	500	ug/kg
1,1-Dichloroethene	<	500	ug/kg
1,1-Dichloroethane	<	500	ug/kg
1,2-Dichloroethenes, total	<	500	ug/kg
Chloroform	<	500	ug/kg
1,2-Dichloroethane	<	500	ug/kg
2-Butanone	(140)*	10,000	ug/kg
1,1,1-Trichloroethane	(350)*	500	ug/kg
Carbon Tetrachloride	<	500	ug/kg
Vinyl Acetate	<	5,000	ug/kg
Bromodichloromethane	<	500	ug/kg
1,2-Dichloropropane	<	500	ug/kg
Trans-1,3-Dichloropropene	<	500	ug/kg
Trichloroethene	<	500	ug/kg
Dibromochloromethane	<	500	ug/kg
1,1,2-Trichloroethane	<	500	ug/kg
Benzene	<	500	ug/kg
Cis-1,3-Dichloropropene	<	500	ug/kg
2-Chloroethyl Vinyl Ether	<	1,000	ug/kg
Bromoform	<	500	ug/kg
4-Methyl-2-Pentanone	<	5,000	ug/kg
2-Hexanone	<	5,000	ug/kg
Tetrachloroethene	<	500	ug/kg
1,1,2,2-Tetrachloroethane	<	500	ug/kg
Toluene	(120)*	500	ug/kg
Chlorobenzene	<	500	ug/kg
Ethylbenzene	<	500	ug/kg
Styrene	<	500	ug/kg
Xylenes, total	<	500	ug/kg

Surrogate Recoveries		QC Limits
Toluene-d_3	108 %	66-130
4-Bromofluorobenzene	97 %	66-134
1,2-Dichloroethane-d_4	99 %	59-127

* Detected below reporting limit; quantitation may be unreliable.
< = Compound not detected at or above the listed reporting limit.

Semivolatile Organic Compounds - EPA Method 8270

Client: Soil Tech
Client Sample ID: 18.6-46532-3S-S2H
VISTA Sample ID: 935805-003 Sample Type: Soil
Date Sampled : 01/28/93 Date Received: 01/29/93
Date Extracted: 02/11/93 Date Analyzed: 02/13/93

Analyte	Result	Reporting Limit	Units
Phenol	<	1,650	ug/kg
Bis(2-Chloroethyl) Ether	<	1,650	ug/kg
2-Chlorophenol	<	1,650	ug/kg
1,3-Dichlorobenzene	<	1,650	ug/kg
1,4-Dichlorobenzene	<	1,650	ug/kg
Benzyl Alcohol	<	3,300	ug/kg
1,2-Dichlorobenzene	<	1,650	ug/kg
2-Methylphenol	<	1,650	ug/kg
Bis(2-Chloroisopropyl) Ether	<	1,650	ug/kg
4-Methylphenol	<	1,650	ug/kg
N-Nitroso-di-n-propylamine	<	1,650	ug/kg
Hexachloroethane	<	1,650	ug/kg
Nitrobenzene	<	1,650	ug/kg
Isophorone	<	1,650	ug/kg
2-Nitrophenol	<	1,650	ug/kg
2,4-Dimethylphenol	<	1,650	ug/kg
Benzoic Acid	<	8,500	ug/kg
Bis(2-Chloroethoxy)methane	<	1,650	ug/kg
2,4-Dichlorophenol	<	1,650	ug/kg
1,2,4-Trichlorobenzene	<	1,650	ug/kg
Naphthalene	<	1,650	ug/kg
4-Chloroaniline	<	3,300	ug/kg
Hexachlorobutadiene	<	1,650	ug/kg
4-Chloro-3-methylphenol	<	3,300	ug/kg
2-Methylnaphthalene	<	1,650	ug/kg
Hexachlorocyclopentadiene	<	1,650	ug/kg
2,4,6-Trichlorophenol	<	1,650	ug/kg
2,4,5-Trichlorophenol	<	1,650	ug/kg
2-Chloronaphthalene	<	1,650	ug/kg
2-Nitroaniline	<	8,500	ug/kg
Dimethyl Phthalate	<	1,650	ug/kg
Acenaphthylene	<	1,650	ug/kg
3-Nitroaniline	<	8,500	ug/kg
Acenaphthene	<	1,650	ug/kg
2,4-Dinitrophenol	<	8,500	ug/kg
4-Nitrophenol	<	8,500	ug/kg
Dibenzofuran	<	1,650	ug/kg

< = Compound not detected at or above the listed reporting limit.

Semivolatile Organic Compounds - EPA Method 8270
Continued

VISTA Sample ID: 935605-[illegible]

Analyte	Result	Reporting Limit	Units
2,4-Dinitrotoluene	<	1,650	ug/kg
2,6-Dinitrotoluene	<	1,650	ug/kg
Diethyl Phthalate	<	1,650	ug/kg
4-Chlorophenyl Phenyl Ether	<	1,650	ug/kg
Fluorene	<	1,650	ug/kg
4-Nitroaniline	<	8,500	ug/kg
4,6-Dinitro-2-methylphenol	<	8,500	ug/kg
N-Nitrosodiphenylamine	<	1,650	ug/kg
4-Bromophenyl Phenyl Ether	<	1,650	ug/kg
Hexachlorobenzene	<	1,650	ug/kg
Pentachlorophenol	<	8,500	ug/kg
Phenanthrene	<	1,650	ug/kg
Anthracene	<	1,650	ug/kg
Di-n-butyl Phthalate	<	1,650	ug/kg
Fluoranthene	<	1,650	ug/kg
Pyrene	<	1,650	ug/kg
Butylbenzyl Phthalate	<	1,650	ug/kg
3,3'-Dichlorobenzidine	<	3,300	ug/kg
Benzo(a)anthracene	<	1,650	ug/kg
Bis(2-Ethylhexyl) Phthalate	<	1,650	ug/kg
Chrysene	<	1,650	ug/kg
Di-n-octyl Phthalate	<	1,650	ug/kg
Benzo(b)fluoranthene	<	1,650	ug/kg
Benzo(k)fluoranthene	<	1,650	ug/kg
Benzo(a)pyrene	<	1,650	ug/kg
Indeno(1,2,3-cd)pyrene	<	1,650	ug/kg
Dibenz(a,h)anthracene	<	1,650	ug/kg
Benzo(g,h,i)perylene	<	1,650	ug/kg

Surrogate Recoveries		QC Limits
Nitrobenzene-d_5	65 %	38-93
2-Fluorobiphenyl	83 %	37-99
Terphenyl-d_{14}	108 %	57-[illegible]
Phenol-d_6	47 %	26-[illegible]
2-Fluorophenol	30 %	16-[illegible]
2,4,6-Tribromophenol	84 %	[illegible]-[illegible]

< = Compound not detected at or above the listed reporting limit.

Total Recoverable Petroleum Hydrocarbons
EPA Method 418.1

Client: Soil Tech
Client Sample ID: 18.7-46532-3S-S2L
VISTA Sample ID: 935805-004 Sample Type: Soil
Date Sampled : 01/28/93 Date Received: 01/29/93
Date Extracted: 02/09/93 Date Analyzed: 02/09/93

Analyte	Result	Reporting Limit	Units
TRPH	<	40	mg/kg

< = Compound not detected at or above the listed reporting limit.

Polychlorinated Biphenyls
EPA Method 8080

Client: Soil Tech
Client Sample ID: 18.7-46532-3S-S2L
VISTA Sample ID: 935805-004 Sample Type: Soil
Date Sampled : 01/28/93 Date Received: 01/29/93
Date Extracted: 02/03/93 Date Analyzed: 02/03/93

Analyte	Result	Reporting Limit	Units
PCB-1016	<	3	mg/kg
PCB-1221	<	3	mg/kg
PCB-1232	<	2	mg/kg
PCB-1242	<	1	mg/kg
PCB-1248	<	1	mg/kg
PCB-1254	<	1	mg/kg
PCB-1260	<	1	mg/kg

< = Compound not detected at or above the listed reporting limit.

Volatile Organic Compounds - EPA Method 8240

Client: Soil Tech
Client Sample ID: 18.7-46532-33-S2L
VISTA Sample ID: 935805-004 Sample Type: Soil
Date Sampled : 01/28/93 Date Received: 01/29/93
Date Analyzed: 02/10/93

Analyte	Result	Reporting Limit	Units
Chloromethane	<	1,000	ug/kg
Bromomethane	<	1,000	ug/kg
Vinyl Chloride	<	1,000	ug/kg
Chloroethane	<	1,000	ug/kg
Methylene Chloride	(100)*	500	ug/kg
Acetone	(1,200)*	10,000	ug/kg
Carbon Disulfide	(170)*	500	ug/kg
1,1-Dichloroethene	<	500	ug/kg
1,1-Dichloroethane	<	500	ug/kg
1,2-Dichloroethenes, total	<	500	ug/kg
Chloroform	<	500	ug/kg
1,2-Dichloroethane	<	500	ug/kg
2-Butanone	<	10,000	ug/kg
1,1,1-Trichloroethane	<	500	ug/kg
Carbon Tetrachloride	<	500	ug/kg
Vinyl Acetate	<	5,000	ug/kg
Bromodichloromethane	<	500	ug/kg
1,2-Dichloropropane	<	500	ug/kg
Trans-1,3-Dichloropropene	<	500	ug/kg
Trichloroethene	<	500	ug/kg
Dibromochloromethane	<	500	ug/kg
1,1,2-Trichloroethane	<	500	ug/kg
Benzene	<	500	ug/kg
Cis-1,3-Dichloropropene	<	500	ug/kg
2-Chloroethyl Vinyl Ether	<	1,000	ug/kg
Bromoform	<	500	ug/kg
4-Methyl-2-Pentanone	<	5,000	ug/kg
2-Hexanone	<	5,000	ug/kg
Tetrachloroethene	<	500	ug/kg
1,1,2,2-Tetrachloroethane	<	500	ug/kg
Toluene	<	500	ug/kg
Chlorobenzene	<	500	ug/kg
Ethylbenzene	<	500	ug/kg
Styrene	<	500	ug/kg
Xylenes, total	<	500	ug/kg

Surrogate Recoveries		QC Limits
Toluene-d_8	111 %	66-103
4-Bromofluorobenzene	108 %	66-134
1,2-Dichloroethane-d_4	92 %	59-127

* Detected below reporting limit; quantitation may be unreliable.
< = Compound not detected at or above the listed reporting limit.

Semivolatile Organic Compounds - EPA Method 8270

Client: Soil Tech
Client Sample ID: 18.7-46532-3S-S2L
VISTA Sample ID: 935805-004 Sample Type: Soil
Date Sampled : 01/28/93 Date Received: 01/29/93
Date Extracted: 02/11/93 Date Analyzed: 02/13/93

Analyte	Result	Reporting Limit	Units
Phenol	<	1,650	ug/kg
Bis(2-Chloroethyl) Ether	<	1,650	ug/kg
2-Chlorophenol	<	1,650	ug/kg
1,3-Dichlorobenzene	<	1,650	ug/kg
1,4-Dichlorobenzene	<	1,650	ug/kg
Benzyl Alcohol	<	3,300	ug/kg
1,2-Dichlorobenzene	<	1,650	ug/kg
2-Methylphenol	<	1,650	ug/kg
Bis(2-Chloroisopropyl) Ether	<	1,650	ug/kg
4-Methylphenol	<	1,650	ug/kg
N-Nitroso-di-n-propylamine	<	1,650	ug/kg
Hexachloroethane	<	1,650	ug/kg
Nitrobenzene	<	1,650	ug/kg
Isophorone	<	1,650	ug/kg
2-Nitrophenol	<	1,650	ug/kg
2,4-Dimethylphenol	<	1,650	ug/kg
Benzoic Acid	<	8,500	ug/kg
Bis(2-Chloroethoxy)methane	<	1,650	ug/kg
2,4-Dichlorophenol	<	1,650	ug/kg
1,2,4-Trichlorobenzene	<	1,650	ug/kg
Naphthalene	<	1,650	ug/kg
4-Chloroaniline	<	3,300	ug/kg
Hexachlorobutadiene	<	1,650	ug/kg
4-Chloro-3-methylphenol	<	3,300	ug/kg
2-Methylnaphthalene	<	1,650	ug/kg
Hexachlorocyclopentadiene	<	1,650	ug/kg
2,4,6-Trichlorophenol	<	1,650	ug/kg
2,4,5-Trichlorophenol	<	1,650	ug/kg
2-Chloronaphthalene	<	1,650	ug/kg
2-Nitroaniline	<	8,500	ug/kg
Dimethyl Phthalate	<	1,650	ug/kg
Acenaphthylene	<	1,650	ug/kg
3-Nitroaniline	<	8,500	ug/kg
Acenaphthene	<	1,650	ug/kg
2,4-Dinitrophenol	<	8,500	ug/kg
4-Nitrophenol	<	8,500	ug/kg
Dibenzofuran	<	1,650	ug/kg

< = Compound not detected at or above the listed reporting limit.

Semivolatile Organic Compounds - EPA Method 8270
continued

VISTA Sample ID: 935805-004

Analyte	Result	Reporting Limit	Units
2,4-Dinitrotoluene	<	1,650	ug/kg
2,6-Dinitrotoluene	<	1,650	ug/kg
Diethyl Phthalate	<	1,650	ug/kg
4-Chlorophenyl Phenyl Ether	<	1,650	ug/kg
Fluorene	<	1,650	ug/kg
4-Nitroaniline	<	8,500	ug/kg
4,6-Dinitro-2-methylphenol	<	8,500	ug/kg
N-Nitrosodiphenylamine	<	1,650	ug/kg
4-Bromophenyl Phenyl Ether	<	1,650	ug/kg
Hexachlorobenzene	<	1,650	ug/kg
Pentachlorophenol	<	8,500	ug/kg
Phenanthrene	<	1,650	ug/kg
Anthracene	<	1,650	ug/kg
Di-n-butyl Phthalate	<	1,650	ug/kg
Fluoranthene	<	1,650	ug/kg
Pyrene	<	1,650	ug/kg
Butylbenzyl Phthalate	<	1,650	ug/kg
3,3'-Dichlorobenzidine	<	3,300	ug/kg
Benzo(a)anthracene	<	1,650	ug/kg
Bis(2-Ethylhexyl) Phthalate	<	1,650	ug/kg
Chrysene	<	1,650	ug/kg
Di-n-octyl Phthalate	<	1,650	ug/kg
Benzo(b)fluoranthene	<	1,650	ug/kg
Benzo(k)fluoranthene	<	1,650	ug/kg
Benzo(a)pyrene	<	1,650	ug/kg
Indeno(1,2,3-cd)pyrene	<	1,650	ug/kg
Dibenz(a,h)anthracene	<	1,650	ug/kg
Benzo(g,h,i)perylene	<	1,650	ug/kg

Surrogate Recoveries		QC Limits
Nitrobenzene-d_5	56 %	35-93
2-Fluorobiphenyl	77 %	27-99
Terphenyl-d_{14}	116 %	37-109
Phenol-d_6	52 %	26-103
2-Fluorophenol	45 %	16-97
2,4,6-Tribromophenol	81 %	19-101

< = Compound not detected at or above the listed reporting limit.

Total Recoverable Petroleum Hydrocarbons
EPA Method 418.1

Client: Soil Tech
Client Sample ID: 18.9-46522-4S-SOH
VISTA Sample ID: 935805-005 Sample Type: Soil
Date Sampled : 01/28/93 Date Received: 01/29/93
Date Extracted: 02/09/93 Date Analyzed: 02/09/93

Analyte	Result	Reporting Limit	Units
TRPH	<	40	mg/kg

< = Compound not detected at or above the listed reporting limit.

Polychlorinated Biphenyls
EPA Method 8080

Client: Soil Tech
Client Sample ID: 18.9-46532-4S-S2H
VISTA Sample ID: 935805-005 Sample Type: Soil
Date Sampled : 01/28/93 Date Received: 01/29/93
Date Extracted: 02/03/93 Date Analyzed: 02/03/93

Analyte	Result	Reporting Limit	Units
PCB-1016	<	3	mg/kg
PCB-1221	<	3	mg/kg
PCB-1232	<	2	mg/kg
PCB-1242	<	1	mg/kg
PCB-1248	<	1	mg/kg
PCB-1254	<	1	mg/kg
PCB-1260	<	1	mg/kg

< = Compound not detected at or above the listed reporting limit

Volatile Organic Compounds - EPA Method 8240

Client: Soil Tech
Client Sample ID: 18.9-46832-4[illegible]-S[illegible]
VISTA Sample ID: 935805-005 Sample Type: Soil
Date Sampled : 01/28/93 Date Received: 01/29/93
Date Analyzed: 02/0/93

Analyte	Result	Reporting Limit	Units
Chloromethane	<	1,000	ug/kg
Bromomethane	<	1,000	ug/kg
Vinyl Chloride	<	1,000	ug/kg
Chloroethane	(110)*	1,000	ug/kg
Methylene Chloride	<	500	ug/kg
Acetone	(1,800)*	10,000	ug/kg
Carbon Disulfide	<	500	ug/kg
1,1-Dichloroethene	<	500	ug/kg
1,1-Dichloroethane	<	500	ug/kg
1,2-Dichloroethenes, total	<	500	ug/kg
Chloroform	<	500	ug/kg
1,2-Dichloroethane	<	500	ug/kg
2-Butanone	<	10,000	ug/kg
1,1,1-Trichloroethane	(220)*	500	ug/kg
Carbon Tetrachloride	<	500	ug/kg
Vinyl Acetate	<	5,000	ug/kg
Bromodichloromethane	<	500	ug/kg
1,2-Dichloropropane	<	500	ug/kg
Trans-1,3-Dichloropropene	<	500	ug/kg
Trichloroethene	<	500	ug/kg
Dibromochloromethane	<	500	ug/kg
1,1,2-Trichloroethane	<	500	ug/kg
Benzene	<	500	ug/kg
Cis-1,3-Dichloropropene	<	500	ug/kg
2-Chloroethyl Vinyl Ether	<	1,000	ug/kg
Bromoform	<	500	ug/kg
4-Methyl-2-Pentanone	<	5,000	ug/kg
2-Hexanone	<	5,000	ug/kg
Tetrachloroethene	<	500	ug/kg
1,1,2,2-Tetrachloroethane	<	500	ug/kg
Toluene	<	500	ug/kg
Chlorobenzene	<	500	ug/kg
Ethylbenzene	<	500	ug/kg
Styrene	<	500	ug/kg
Xylenes, total	<	500	ug/kg

Surrogate Recoveries		QC Limits
Toluene-d_3	[illegible]	[illegible]
4-Bromofluorobenzene	[illegible]	[illegible]
1,2-Dichloroethane-d_4	[illegible]	[illegible]

* Detected below reporting limit; quantitation may be unreliable.
< = Compound not detected at or above the listed reporting limit.

Semivolatile Organic Compounds - EPA Method 8270

Client: Soil Tech
Client Sample ID: 18.9-46532-4S-S2H
VISTA Sample ID: 935805-005 Sample Type: Soil
Date Sampled : 01/28/93 Date Received: 01/29/93
Date Extracted: 02/11/93 Date Analyzed: 02/13/93

Analyte	Result	Reporting Limit	Units
Phenol	<	330	ug/kg
Bis(2-Chloroethyl) Ether	<	330	ug/kg
2-Chlorophenol	<	330	ug/kg
1,3-Dichlorobenzene	<	330	ug/kg
1,4-Dichlorobenzene	<	330	ug/kg
Benzyl Alcohol	<	660	ug/kg
1,2-Dichlorobenzene	<	330	ug/kg
2-Methylphenol	<	330	ug/kg
Bis(2-Chloroisopropyl) Ether	<	330	ug/kg
4-Methylphenol	<	330	ug/kg
N-Nitroso-di-n-propylamine	<	330	ug/kg
Hexachloroethane	<	330	ug/kg
Nitrobenzene	<	330	ug/kg
Isophorone	<	330	ug/kg
2-Nitrophenol	<	330	ug/kg
2,4-Dimethylphenol	<	330	ug/kg
Benzoic Acid	<	1,700	ug/kg
Bis(2-Chloroethoxy)methane	<	330	ug/kg
2,4-Dichlorophenol	<	330	ug/kg
1,2,4-Trichlorobenzene	<	330	ug/kg
Naphthalene	<	330	ug/kg
4-Chloroaniline	<	660	ug/kg
Hexachlorobutadiene	<	330	ug/kg
4-Chloro-3-methylphenol	<	660	ug/kg
2-Methylnaphthalene	<	330	ug/kg
Hexachlorocyclopentadiene	<	330	ug/kg
2,4,6-Trichlorophenol	<	330	ug/kg
2,4,5-Trichlorophenol	<	330	ug/kg
2-Chloronaphthalene	<	330	ug/kg
2-Nitroaniline	<	1,700	ug/kg
Dimethyl Phthalate	<	330	ug/kg
Acenaphthylene	<	330	ug/kg
3-Nitroaniline	<	1,700	ug/kg
Acenaphthene	<	330	ug/kg
2,4-Dinitrophenol	<	1,700	ug/kg
4-Nitrophenol	<	1,700	ug/kg
Dibenzofuran	<	330	ug/kg

< = Compound not detected at or above the listed reporting limit.

Semivolatile Organic Compounds - EPA Method 8270
Continued

VISTA Sample ID: 935805-005

Analyte	Result	Reporting Limit	Units
2,4-Dinitrotoluene	<	330	ug/kg
2,6-Dinitrotoluene	<	330	ug/kg
Diethyl Phthalate	<	330	ug/kg
4-Chlorophenyl Phenyl Ether	<	330	ug/kg
Fluorene	<	330	ug/kg
4-Nitroaniline	<	1,700	ug/kg
4,6-Dinitro-2-methylphenol	<	1,700	ug/kg
N-Nitrosodiphenylamine	<	330	ug/kg
4-Bromophenyl Phenyl Ether	<	330	ug/kg
Hexachlorobenzene	<	330	ug/kg
Pentachlorophenol	<	1,700	ug/kg
Phenanthrene	<	330	ug/kg
Anthracene	<	330	ug/kg
Di-n-butyl Phthalate	<	330	ug/kg
Fluoranthene	<	330	ug/kg
Pyrene	<	330	ug/kg
Butylbenzyl Phthalate	<	330	ug/kg
3,3'-Dichlorobenzidine	<	660	ug/kg
Benzo(a)anthracene	<	330	ug/kg
Bis(2-Ethylhexyl) Phthalate	<	330	ug/kg
Chrysene	<	330	ug/kg
Di-n-octyl Phthalate	<	330	ug/kg
Benzo(b)fluoranthene	<	330	ug/kg
Benzo(k)fluoranthene	<	330	ug/kg
Benzo(a)pyrene	<	330	ug/kg
Indeno(1,2,3-cd)pyrene	<	330	ug/kg
Dibenz(a,h)anthracene	<	330	ug/kg
Benzo(g,h,i)perylene	<	330	ug/kg

Surrogate Recoveries			QC Limits
Nitrobenzene-d_5	66	%	35-90
2-Fluorobiphenyl	84	%	27-99
Terphenyl-d_{14}	88	%	57-109
Phenol-d_6	61	%	26-102
2-Fluorophenol	59	%	16-97
2,4,6-Tribromophenol	71	%	10-101

< = Compound not detected at or above the listed reporting limit.

Total Recoverable Petroleum Hydrocarbons
EPA Method 418.1

Client: Soil Tech
Client Sample ID: 18.10-46532-4S-S2L
VISTA Sample ID: 935805-006 Sample Type: Soil
Date Sampled : 01/28/93 Date Received: 01/29/93
Date Extracted: 02/09/93 Date Analyzed: 02/09/93

Analyte	Result	Reporting Limit	Units
TRPH	<	40	mg/kg

< = Compound not detected at or above the listed reporting limit.

Polychlorinated Biphenyls
EPA Method 8080

Client: Soil Tech
Client Sample ID: 18.10-46532-4S-S2L
VISTA Sample ID: 935805-006 Sample Type: Soil
Date Sampled : 01/28/93 Date Received: 01/29/93
Date Extracted: 02/03/93 Date Analyzed: 02/03/93

Analyte	Result	Reporting Limit	Units
PCB-1016	<	3	mg/kg
PCB-1221	<	3	mg/kg
PCB-1232	<	2	mg/kg
PCB-1242	<	1	mg/kg
PCB-1248	<	1	mg/kg
PCB-1254	<	1	mg/kg
PCB-1260	<	1	mg/kg

< = Compound not detected at or above the listed reporting limit.

Volatile Organic Compounds - EPA Method 8240

Client: Soil Tech
Client Sample ID: 18.10-46600-4S-SOL
VISTA Sample ID: 935805-006 Sample Type: Soil
Date Sampled : 01/28/93 Date Received: 01/29/93
Date Analyzed: 02/10/93

Analyte	Result	Reporting Limit	Units
Chloromethane	<	1,000	ug/kg
Bromomethane	<	1,000	ug/kg
Vinyl Chloride	<	1,000	ug/kg
Chloroethane	<	1,000	ug/kg
Methylene Chloride	<	500	ug/kg
Acetone	(580)*	10,000	ug/kg
Carbon Disulfide	<	500	ug/kg
1,1-Dichloroethene	(140)*	500	ug/kg
1,1-Dichloroethane	<	500	ug/kg
1,2-Dichloroethenes, total	<	500	ug/kg
Chloroform	<	500	ug/kg
1,2-Dichloroethane	<	500	ug/kg
2-Butanone	<	10,000	ug/kg
1,1,1-Trichloroethane	6,700	500	ug/kg
Carbon Tetrachloride	<	500	ug/kg
Vinyl Acetate	<	5,000	ug/kg
Bromodichloromethane	<	500	ug/kg
1,2-Dichloropropane	<	500	ug/kg
Trans-1,3-Dichloropropene	<	500	ug/kg
Trichloroethene	<	500	ug/kg
Dibromochloromethane	<	500	ug/kg
1,1,2-Trichloroethane	<	500	ug/kg
Benzene	<	500	ug/kg
Cis-1,3-Dichloropropene	<	500	ug/kg
2-Chloroethyl Vinyl Ether	<	1,000	ug/kg
Bromoform	<	500	ug/kg
4-Methyl-2-Pentanone	<	5,000	ug/kg
2-Hexanone	<	5,000	ug/kg
Tetrachloroethene	<	500	ug/kg
1,1,2,2-Tetrachloroethane	<	500	ug/kg
Toluene	<	500	ug/kg
Chlorobenzene	<	500	ug/kg
Ethylbenzene	<	500	ug/kg
Styrene	<	500	ug/kg
Xylenes, total	<	500	ug/kg

Surrogate Recoveries			QC Limits
Toluene-d_8	109	%	66-130
4-Bromofluorobenzene	115	%	66-134
1,2-Dichloroethane-d_4	108	%	59-137

* Detected below reporting limit; quantitation may be unreliable.
< Compound not detected at or above the listed reporting limit.

Semivolatile Organic Compounds - EPA Method 8270

Client: Soil Tech
Client Sample ID: 18.10-46532-4S-S2L
VISTA Sample ID: 935805-006 Sample Type: Soil
Date Sampled : 01/28/93 Date Received: 01/29/93
Date Extracted: 02/11/93 Date Analyzed: 02/13/93

Analyte	Result	Reporting Limit	Units
Phenol	<	330	ug/kg
Bis(2-Chloroethyl) Ether	<	330	ug/kg
2-Chlorophenol	<	330	ug/kg
1,3-Dichlorobenzene	<	330	ug/kg
1,4-Dichlorobenzene	<	330	ug/kg
Benzyl Alcohol	<	660	ug/kg
1,2-Dichlorobenzene	<	330	ug/kg
2-Methylphenol	<	330	ug/kg
Bis(2-Chloroisopropyl) Ether	<	330	ug/kg
4-Methylphenol	<	330	ug/kg
N-Nitroso-di-n-propylamine	<	330	ug/kg
Hexachloroethane	<	330	ug/kg
Nitrobenzene	<	330	ug/kg
Isophorone	<	330	ug/kg
2-Nitrophenol	<	330	ug/kg
2,4-Dimethylphenol	<	330	ug/kg
Benzoic Acid	<	1,700	ug/kg
Bis(2-Chloroethoxy)methane	<	330	ug/kg
2,4-Dichlorophenol	<	330	ug/kg
1,2,4-Trichlorobenzene	<	330	ug/kg
Naphthalene	<	330	ug/kg
4-Chloroaniline	<	660	ug/kg
Hexachlorobutadiene	<	330	ug/kg
4-Chloro-3-methylphenol	<	660	ug/kg
2-Methylnaphthalene	<	330	ug/kg
Hexachlorocyclopentadiene	<	330	ug/kg
2,4,6-Trichlorophenol	<	330	ug/kg
2,4,5-Trichlorophenol	<	330	ug/kg
2-Chloronaphthalene	<	330	ug/kg
2-Nitroaniline	<	1,700	ug/kg
Dimethyl Phthalate	<	330	ug/kg
Acenaphthylene	<	330	ug/kg
3-Nitroaniline	<	1,700	ug/kg
Acenaphthene	<	330	ug/kg
2,4-Dinitrophenol	<	1,700	ug/kg
4-Nitrophenol	<	1,700	ug/kg
Dibenzofuran	<	330	ug/kg

< = Compound not detected at or above the listed reporting limit.

Semivolatile Organic Compounds - EPA Method 8270
(continued)

VISTA Sample ID: 935805-006

Analyte	Result	Reporting Limit	Units
2,4-Dinitrotoluene	<	330	ug/kg
2,6-Dinitrotoluene	<	330	ug/kg
Diethyl Phthalate	<	330	ug/kg
4-Chlorophenyl Phenyl Ether	<	330	ug/kg
Fluorene	<	330	ug/kg
4-Nitroaniline	<	1,700	ug/kg
4,6-Dinitro-2-methylphenol	<	1,700	ug/kg
N-Nitrosodiphenylamine	<	330	ug/kg
4-Bromophenyl Phenyl Ether	<	330	ug/kg
Hexachlorobenzene	<	330	ug/kg
Pentachlorophenol	<	1,700	ug/kg
Phenanthrene	<	330	ug/kg
Anthracene	<	330	ug/kg
Di-n-butyl Phthalate	<	330	ug/kg
Fluoranthene	<	330	ug/kg
Pyrene	<	330	ug/kg
Butylbenzyl Phthalate	<	330	ug/kg
3,3'-Dichlorobenzidine	<	660	ug/kg
Benzo(a)anthracene	<	330	ug/kg
Bis(2-Ethylhexyl) Phthalate	<	330	ug/kg
Chrysene	<	330	ug/kg
Di-n-octyl Phthalate	<	330	ug/kg
Benzo(b)fluoranthene	<	330	ug/kg
Benzo(k)fluoranthene	<	330	ug/kg
Benzo(a)pyrene	<	330	ug/kg
Indeno(1,2,3-cd)pyrene	<	330	ug/kg
Dibenz(a,h)anthracene	<	330	ug/kg
Benzo(g,h,i)perylene	<	330	ug/kg

Surrogate Recoveries			QC Limits
Nitrobenzene-d_5	68	%	35-90
2-Fluorobiphenyl	83	%	37-99
Terphenyl-d_{14}	92	%	57-109
Phenol-d_6	55	%	26-102
2-Fluorophenol	55	%	16-97
2,4,6-Tribromophenol	70	%	10-121

< = Compound not detected at or above the listed reporting limit.

Simulated Distillation/Total Petroleum Hydrocarbons
GC/FID - ASTM D2887/CDHS Method

Client: Soil Tech
Client Sample ID: 18.67-46532-3S-L1(O)
VISTA Sample ID: 935805-007 Upper Sample Type: Waste
Date Sampled : 01/28/93 Date Received: 01/29/93
Date Extracted: 02/08/93 Date Analyzed: 02/10/93

Hydrocarbon - Boiling Point		% Eluting
C_7	- 98°C	0 %
C_8	- 126°C	9 %
C_9	- 151°C	29 %
C_{10}	- 174°C	48 %
C_{11}	- 196°C	66 %
C_{12}	- 216°C	79 %
C_{14}	- 254°C	89 %
C_{16}	- 287°C	93 %
C_{18}	- 316°C	95 %
C_{20}	- 344°C	96 %
C_{24}	- 391°C	98 %
C_{28}	- 431°C	100 %
C_{32}	- 466°C	100 %
C_{36}	- 496°C	100 %
C_{40}	- 522°C	100 %
C_{44}	- 545°C	100 %

Polychlorinated Biphenyls
EPA Method 8080

Client: Soil Tech
Client Sample ID: 18.67-46532-3S-L1(O)
VISTA Sample ID: 935805-007 Upper Sample Type: Waste
Date Sampled : 01/28/93 Date Received: 01/29/93
Date Extracted: 02/03/93 Date Analyzed: 02/04/93

Analyte	Result	Reporting Limit	Units
PCB-1016	<	300	mg/kg
PCB-1221	<	300	mg/kg
PCB-1232	<	200	mg/kg
PCB-1242	<	100	mg/kg
PCB-1248	2,500	100	mg/kg
PCB-1254	<	100	mg/kg
PCB-1260	<	100	mg/kg

< = Compound not detected at or above the listed reporting limit.

Polychlorinated Biphenyls
EPA Method 8080

Client: Soil Tech
Client Sample ID: 18.67-46532-3S-L1(W)
VISTA Sample ID: 935805-007 Lower Sample Type: Waste
Date Sampled : 01/28/93 Date Received: 01/29/93
Date Extracted: 02/03/93 Date Analyzed: 02/04/93

Analyte	Result	Reporting Limit	Units
PCB-1016	<	30	mg/kg
PCB-1221	<	30	mg/kg
PCB-1232	<	20	mg/kg
PCB-1242	<	10	mg/kg
PCB-1248	69	10	mg/kg
PCB-1254	<	10	mg/kg
PCB-1260	<	10	mg/kg

< = Compound not detected at or above the listed reporting limit.

Volatile Organic Compounds - EPA Method 8240

Client: Soil Tech
Client Sample ID: 18.67-46530-08-11
VISTA Sample ID: 935805-007 Sample Type: Waste
Date Sampled : 01/28/93 Date Received: 01/29/93
Date Analyzed: 02/11/93

Analyte	Result	Reporting Limit	Units
Chloromethane	<	5,000	mg/kg
Bromomethane	<	5,000	mg/kg
Vinyl Chloride	<	5,000	mg/kg
Chloroethane	<	5,000	mg/kg
Methylene Chloride	11,000	2,500	mg/kg
Acetone	800,000	50,000	mg/kg
Carbon Disulfide	<	2,500	mg/kg
1,1-Dichloroethene	(1,500)*	2,500	mg/kg
1,1-Dichloroethane	4,700	2,500	mg/kg
1,2-Dichloroethenes, total	<	2,500	mg/kg
Chloroform	<	2,500	mg/kg
1,2-Dichloroethane	30,000	2,500	mg/kg
2-Butanone	390,000	50,000	mg/kg
1,1,1-Trichloroethane	12,000	2,500	mg/kg
Carbon Tetrachloride	<	2,500	mg/kg
Vinyl Acetate	<	25,000	mg/kg
Bromodichloromethane	<	2,500	mg/kg
1,2-Dichloropropane	<	2,500	mg/kg
Trans-1,3-Dichloropropene	<	2,500	mg/kg
Trichloroethene	7,000	2,500	mg/kg
Dibromochloromethane	<	2,500	mg/kg
1,1,2-Trichloroethane	<	2,500	mg/kg
Benzene	21,000	2,500	mg/kg
Cis-1,3-Dichloropropene	<	2,500	mg/kg
2-Chloroethyl Vinyl Ether	<	5,000	mg/kg
Bromoform	<	2,500	mg/kg
4-Methyl-2-Pentanone	(8,500)*	25,000	mg/kg
2-Hexanone	<	25,000	mg/kg
Tetrachloroethene	7,200	2,500	mg/kg
1,1,2,2-Tetrachloroethane	<	2,500	mg/kg
Toluene	5,400	2,500	mg/kg
Chlorobenzene	<	2,500	mg/kg
Ethylbenzene	(950)*	2,500	mg/kg
Styrene	(1,700)*	2,500	mg/kg
Xylenes, total	5,600	2,500	mg/kg

Surrogate Recoveries			QC Limits
Toluene-d_8	107	%	66-130
4-Bromofluorobenzene	99	%	66-134
1,2-Dichloroethane-d_4	94	%	59-137

NA = Not Applicable
< = Compound not detected at or above the listed reporting limit.

Semivolatile Organic Compounds - EPA Method 8270

Client: Soil Tech
Client Sample ID: 18.67-46532-3S-11(O)
VISTA Sample ID: 935805-007 Upper Sample Type: Waste
Date Sampled : 01/28/93 Date Received: 01/29/93
Date Extracted: 02/03/93 Date Analyzed: 02/04/93

Analyte	Result	Reporting Limit	Units
Phenol	1,600	100	mg/kg
Bis(2-Chloroethyl) Ether	430	100	mg/kg
2-Chlorophenol	<	100	mg/kg
1,3-Dichlorobenzene	<	100	mg/kg
1,4-Dichlorobenzene	<	100	mg/kg
Benzyl Alcohol	(530)*	2,000	mg/kg
1,2-Dichlorobenzene	170	100	mg/kg
2-Methylphenol	360	100	mg/kg
Bis(2-Chloroisopropyl) Ether	<	100	mg/kg
4-Methylphenol	480	100	mg/kg
N-Nitroso-di-n-propylamine	<	100	mg/kg
Hexachloroethane	<	100	mg/kg
Nitrobenzene	<	100	mg/kg
Isophorone	930	100	mg/kg
2-Nitrophenol	180	100	mg/kg
2,4-Dimethylphenol	<	100	mg/kg
Benzoic Acid	(1,900)*	5,000	mg/kg
Bis(2-Chloroethoxy)methane	<	100	mg/kg
2,4-Dichlorophenol	<	100	mg/kg
1,2,4-Trichlorobenzene	<	100	mg/kg
Naphthalene	1,300	1,000	mg/kg
4-Chloroaniline	<	200	mg/kg
Hexachlorobutadiene	<	100	mg/kg
4-Chloro-3-methylphenol	<	200	mg/kg
2-Methylnaphthalene	840	100	mg/kg
Hexachlorocyclopentadiene	<	100	mg/kg
2,4,6-Trichlorophenol	<	100	mg/kg
2,4,5-Trichlorophenol	<	100	mg/kg
2-Chloronaphthalene	<	100	mg/kg
2-Nitroaniline	<	500	mg/kg
Dimethyl Phthalate	(69)*	100	mg/kg
Acenaphthylene	(80)*	100	mg/kg
3-Nitroaniline	<	500	mg/kg
Acenaphthene	<	100	mg/kg
2,4-Dinitrophenol	<	500	mg/kg
4-Nitrophenol	<	500	mg/kg
Dibenzofuran	<	100	mg/kg

< = Compound not detected at or above the listed reporting limit.

Semivolatile Organic Compounds - EPA Method 8270
Continued

VISTA Sample ID: 935805-007 Upper

Analyte	Result	Reporting Limit	Units
2,4-Dinitrotoluene	<	100	mg/kg
2,6-Dinitrotoluene	<	100	mg/kg
Diethyl Phthalate	<	100	mg/kg
4-Chlorophenyl Phenyl Ether	<	100	mg/kg
Fluorene	(36)*	100	mg/kg
4-Nitroaniline	<	500	mg/kg
4,6-Dinitro-2-methylphenol	<	500	mg/kg
N-Nitrosodiphenylamine	<	100	mg/kg
4-Bromophenyl Phenyl Ether	<	100	mg/kg
Hexachlorobenzene	<	100	mg/kg
Pentachlorophenol	<	500	mg/kg
Phenanthrene	(44)*	100	mg/kg
Anthracene	(14)*	100	mg/kg
Di-n-butyl Phthalate	290	100	mg/kg
Fluoranthene	<	100	mg/kg
Pyrene	(14)*	100	mg/kg
Butylbenzyl Phthalate	(49)*	100	mg/kg
3,3'-Dichlorobenzidine	<	200	mg/kg
Benzo(a)anthracene	<	100	mg/kg
Bis(2-Ethylhexyl) Phthalate	1,300	100	mg/kg
Chrysene	120	100	mg/kg
Di-n-octyl Phthalate	(11)*	100	mg/kg
Benzo(b)fluoranthene	<	100	mg/kg
Benzo(k)fluoranthene	<	100	mg/kg
Benzo(a)pyrene	<	100	mg/kg
Indeno(1,2,3-cd)pyrene	<	100	mg/kg
Dibenz(a,h)anthracene	<	100	mg/kg
Benzo(g,h,i)perylene	<	100	mg/kg

Surrogate Recoveries		QC Limits
Nitrobenzene-d_5	196 %	32-118
2-Fluorobiphenyl	114 %	37-114
Terphenyl-d_{14}	123 %	44-131
Phenol-d_6	127 %	33-121
2-Fluorophenol	85 %	10-141
2,4,6-Tribromophenol	130 %	15-114

* Detected below reporting limit; quantitation may be unreliable.
< = Compound not detected at or above the listed reporting limit.

Semivolatile Organic Compounds - EPA Method 8270

Client: Soil Tech
Client Sample ID: 18.67-46500-03-LL(W)
VISTA Sample ID: 935805-007 Lower Sample Type: Waste
Date Sampled : 01/28/93 Date Received: 01/29/93
Date Extracted: 02/03/93 Date Analyzed: 02/04/93

Analyte	Result	Reporting Limit	Units
Phenol	740	100	mg/kg
Bis(2-Chloroethyl) Ether	(41)*	100	mg/kg
2-Chlorophenol	<	100	mg/kg
1,3-Dichlorobenzene	<	100	mg/kg
1,4-Dichlorobenzene	<	100	mg/kg
Benzyl Alcohol	(83)*	200	mg/kg
1,2-Dichlorobenzene	<	100	mg/kg
2-Methylphenol	(41)*	100	mg/kg
Bis(2-Chloroisopropyl) Ether	<	100	mg/kg
4-Methylphenol	(67)*	100	mg/kg
N-Nitroso-di-n-propylamine	<	100	mg/kg
Hexachloroethane	<	100	mg/kg
Nitrobenzene	<	100	mg/kg
Isophorone	(31)*	100	mg/kg
2-Nitrophenol	<	100	mg/kg
2,4-Dimethylphenol	<	100	mg/kg
Benzoic Acid	450	500	mg/kg
Bis(2-Chloroethoxy)methane	<	100	mg/kg
2,4-Dichlorophenol	<	100	mg/kg
1,2,4-Trichlorobenzene	<	100	mg/kg
Naphthalene	17)*	100	mg/kg
4-Chloroaniline	<	200	mg/kg
Hexachlorobutadiene	<	100	mg/kg
4-Chloro-3-methylphenol	<	200	mg/kg
2-Methylnaphthalene	<	100	mg/kg
Hexachlorocyclopentadiene	<	100	mg/kg
2,4,6-Trichlorophenol	<	100	mg/kg
2,4,5-Trichlorophenol	<	100	mg/kg
2-Chloronaphthalene	<	100	mg/kg
2-Nitroaniline	<	500	mg/kg
Dimethyl Phthalate	<	100	mg/kg
Acenaphthylene	<	100	mg/kg
3-Nitroaniline	<	500	mg/kg
Acenaphthene	<	100	mg/kg
2,4-Dinitrophenol	<	500	mg/kg
4-Nitrophenol	<	500	mg/kg
Dibenzofuran	<	100	mg/kg

* Detected below reporting limit; quantitation may be unreliable.
< = Compound not detected at or above the listed reporting limit.

Semivolatile Organic Compounds - EPA Method 8270
(continued)

VISTA Sample ID: 935805-007 Lower

Analyte	Result	Reporting Limit	Units
2,4-Dinitrotoluene	<	100	mg/kg
2,6-Dinitrotoluene	<	100	mg/kg
Diethyl Phthalate	<	100	mg/kg
4-Chlorophenyl Phenyl Ether	<	100	mg/kg
Fluorene	<	100	mg/kg
4-Nitroaniline	<	500	mg/kg
4,6-Dinitro-2-methylphenol	<	500	mg/kg
N-Nitrosodiphenylamine	<	100	mg/kg
4-Bromophenyl Phenyl Ether	<	100	mg/kg
Hexachlorobenzene	<	100	mg/kg
Pentachlorophenol	<	500	mg/kg
Phenanthrene	<	100	mg/kg
Anthracene	<	100	mg/kg
Di-n-butyl Phthalate	<	100	mg/kg
Fluoranthene	<	100	mg/kg
Pyrene	<	100	mg/kg
Butylbenzyl Phthalate	<	100	mg/kg
3,3'-Dichlorobenzidine	<	200	mg/kg
Benzo(a)anthracene	<	100	mg/kg
Bis(2-Ethylhexyl) Phthalate	(29)*	100	mg/kg
Chrysene	<	100	mg/kg
Di-n-octyl Phthalate	<	100	mg/kg
Benzo(b)fluoranthene	<	100	mg/kg
Benzo(k)fluoranthene	<	100	mg/kg
Benzo(a)pyrene	<	100	mg/kg
Indeno(1,2,3-cd)pyrene	<	100	mg/kg
Dibenz(a,h)anthracene	<	100	mg/kg
Benzo(g,h,i)perylene	<	100	mg/kg

Surrogate Recoveries		QC Limits
Nitrobenzene-d_5	114 %	32-118
2-Fluorobiphenyl	121 %	37-114
Terphenyl-d_{14}	136 %	44-131
Phenol-d_6	99 %	33-121
2-Fluorophenol	103 %	10-141
2,4,6-Tribromophenol	112 %	10-1[illegible]

* Detected below reporting limit; quantitation may be unreliable.
< = Compound not detected at or above the listed reporting limit.

Simulated Distillation/Total Petroleum Hydrocarbons
GC/FID - ASTM D2887/CDHS Method

Client: Soil Tech
Client Sample ID: 18.910-46532-4S-L1(W)
VISTA Sample ID: 935805-008 Lower Sample Type: Waste
Date Sampled : 01/28/93 Date Received: 01/29/93
Date Extracted: 02/08/93 Date Analyzed: 02/10/93

Hydrocarbon - Boiling Point		% Eluting
C_7	- 98°C	0 %
C_8	- 126°C	1 %
C_9	- 151°C	2 %
C_{10}	- 174°C	14 %
C_{11}	- 196°C	18 %
C_{12}	- 216°C	20 %
C_{14}	- 254°C	97 %
C_{16}	- 287°C	98 %
C_{18}	- 316°C	99 %
C_{20}	- 344°C	99 %
C_{24}	- 391°C	100 %
C_{28}	- 431°C	100 %
C_{32}	- 466°C	100 %
C_{36}	- 496°C	100 %
C_{40}	- 522°C	100 %
C_{44}	- 545°C	100 %

Polychlorinated Biphenyls
EPA Method 8080

Client: Soil Tech
Client Sample ID: 18.910-46532-4S-L1(O)
VISTA Sample ID: 935805-008 Upper Sample Type: Waste
Date Sampled : 01/28/93 Date Received: 01/29/93
Date Extracted: 02/03/93 Date Analyzed: 02/04/93

Analyte	Result	Reporting Limit	Units
PCB-1016	<	3	mg/kg
PCB-1221	<	3	mg/kg
PCB-1232	<	2	mg/kg
PCB-1242	<	1	mg/kg
PCB-1248	<	1	mg/kg
PCB-1254	<	1	mg/kg
PCB-1260	<	1	mg/kg

< = Compound not detected at or above the listed reporting limit.

Polychlorinated Biphenyls
EPA Method 8080

Client: Soil Tech
Client Sample ID: 18.910-46532-4S-L1(W)
VISTA Sample ID: 935805-008 Lower Sample Type: Waste
Date Sampled : 01/28/93 Date Received: 01/29/93
Date Extracted: 02/03/93 Date Analyzed: 02/04/93

Analyte	Result	Reporting Limit	Units
PCB-1016	<	300	mg/kg
PCB-1221	<	300	mg/kg
PCB-1232	<	200	mg/kg
PCB-1242	<	100	mg/kg
PCB-1248	330	100	mg/kg
PCB-1254	<	100	mg/kg
PCB-1260	<	100	mg/kg

< - Compound not detected at or above the listed reporting limit.

Volatile Organic Compounds - EPA Method 8240

Client: Soil Tech
Client Sample ID: 18.910-46532-4S-L1(O)
VISTA Sample ID: 935805-008 Upper Sample Type: Waste
Date Sampled : 01/28/93 Date Received: 01/29/93
Date Analyzed: 02/10/93

Analyte	Result	Reporting Limit	Units
Chloromethane	<	5,000	mg/kg
Bromomethane	<	5,000	mg/kg
Vinyl Chloride	<	5,000	mg/kg
Chloroethane	<	5,000	mg/kg
Methylene Chloride	<	2,500	mg/kg
Acetone	(32,000)*	50,000	mg/kg
Carbon Disulfide	<	2,500	mg/kg
1,1-Dichloroethene	<	2,500	mg/kg
1,1-Dichloroethane	<	2,500	mg/kg
1,2-Dichloroethenes, total	<	2,500	mg/kg
Chloroform	<	2,500	mg/kg
1,2-Dichloroethane	<	2,500	mg/kg
2-Butanone	<	50,000	mg/kg
1,1,1-Trichloroethane	19,000	2,500	mg/kg
Carbon Tetrachloride	<	2,500	mg/kg
Vinyl Acetate	<	25,000	mg/kg
Bromodichloromethane	<	2,500	mg/kg
1,2-Dichloropropane	<	2,500	mg/kg
Trans-1,3-Dichloropropene	<	2,500	mg/kg
Trichloroethene	<	2,500	mg/kg
Dibromochloromethane	<	2,500	mg/kg
1,1,2-Trichloroethane	<	2,500	mg/kg
Benzene	<	2,500	mg/kg
Cis-1,3-Dichloropropene	<	2,500	mg/kg
2-Chloroethyl Vinyl Ether	<	5,000	mg/kg
Bromoform	<	2,500	mg/kg
4-Methyl-2-Pentanone	<	25,000	mg/kg
2-Hexanone	<	25,000	mg/kg
Tetrachloroethene	<	2,500	mg/kg
1,1,2,2-Tetrachloroethane	<	2,500	mg/kg
Toluene	<	2,500	mg/kg
Chlorobenzene	<	2,500	mg/kg
Ethylbenzene	<	2,500	mg/kg
Styrene	<	2,500	mg/kg
Xylenes, total	<	2,500	mg/kg

Surrogate Recoveries		QC Limits
Toluene-d_8	105	84-138
4-Bromofluorobenzene	111	59-113
1,2-Dichloroethane-d_4	108	69-157

* Detected below reporting limit; quantitation may be unreliable.
< = Compound not detected at or above the listed reporting limit.

Volatile Organic Compounds - EPA Method 8240

Client: Soil Tech
Client Sample ID: 18.910-46532-4S-L1(W)
VISTA Sample ID: 935805-008 Lower Sample Type: Waste
Date Sampled : 01/28/93 Date Received: 01/29/93
Date Analyzed: 02/10/93

Analyte	Result	Reporting Limit	Units
Chloromethane	<	5,000	mg/kg
Bromomethane	<	5,000	mg/kg
Vinyl Chloride	<	5,000	mg/kg
Chloroethane	<	5,000	mg/kg
Methylene Chloride	<	2,500	mg/kg
Acetone	(16,000)*	50,000	mg/kg
Carbon Disulfide	<	2,500	mg/kg
1,1-Dichloroethene	(700)*	2,500	mg/kg
1,1-Dichloroethane	<	2,500	mg/kg
1,2-Dichloroethenes, total	<	2,500	mg/kg
Chloroform	<	2,500	mg/kg
1,2-Dichloroethane	<	2,500	mg/kg
2-Butanone	<	50,000	mg/kg
1,1,1-Trichloroethane	11,000	2,500	mg/kg
Carbon Tetrachloride	<	2,500	mg/kg
Vinyl Acetate	<	25,000	mg/kg
Bromodichloromethane	<	2,500	mg/kg
1,2-Dichloropropane	<	2,500	mg/kg
Trans-1,3-Dichloropropene	<	2,500	mg/kg
Trichloroethene	<	2,500	mg/kg
Dibromochloromethane	<	2,500	mg/kg
1,1,2-Trichloroethane	<	2,500	mg/kg
Benzene	9,500	2,500	mg/kg
Cis-1,3-Dichloropropene	<	2,500	mg/kg
2-Chloroethyl Vinyl Ether	<	5,000	mg/kg
Bromoform	<	2,500	mg/kg
4-Methyl-2-Pentanone	<	25,000	mg/kg
2-Hexanone	<	25,000	mg/kg
Tetrachloroethene	3,700	2,500	mg/kg
1,1,2,2-Tetrachloroethane	<	2,500	mg/kg
Toluene	1,400	2,500	mg/kg
Chlorobenzene	<	2,500	mg/kg
Ethylbenzene	<	2,500	mg/kg
Styrene	<	2,500	mg/kg
Xylenes, total	2,700	2,500	mg/kg

Surrogate Recoveries		QC Limits
Toluene-d_8	110 %	66-100
4-Bromofluorobenzene	100 %	54-134
1,2-Dichloroethane-d_4	107 %	59-137

* Detected below reporting limit; quantitation may be unreliable.
< = Compound not detected at or above the listed reporting limit.

Semivolatile Organic Compounds - EPA Method 8270

Client: Soil Tech
Client Sample ID: 18.910-46532-4S-L1(O)
VISTA Sample ID: 935805-008 Upper Sample Type: Waste
Date Sampled : 01/28/93 Date Received: 01/29/93
Date Extracted: 02/03/93 Date Analyzed: 02/04/93

Analyte	Result	Reporting Limit	Units
Phenol	290	100	mg/kg
Bis(2-Chloroethyl) Ether	<	100	mg/kg
2-Chlorophenol	<	100	mg/kg
1,3-Dichlorobenzene	<	100	mg/kg
1,4-Dichlorobenzene	<	100	mg/kg
Benzyl Alcohol	<	200	mg/kg
1,2-Dichlorobenzene	<	100	mg/kg
2-Methylphenol	<	100	mg/kg
Bis(2-Chloroisopropyl) Ether	<	100	mg/kg
4-Methylphenol	<	100	mg/kg
N-Nitroso-di-n-propylamine	<	100	mg/kg
Hexachloroethane	<	100	mg/kg
Nitrobenzene	<	100	mg/kg
Isophorone	140	100	mg/kg
2-Nitrophenol	<	100	mg/kg
2,4-Dimethylphenol	<	100	mg/kg
Benzoic Acid	<	500	mg/kg
Bis(2-Chloroethoxy)methane	<	100	mg/kg
2,4-Dichlorophenol	<	100	mg/kg
1,2,4-Trichlorobenzene	<	100	mg/kg
Naphthalene	<	100	mg/kg
4-Chloroaniline	<	200	mg/kg
Hexachlorobutadiene	<	100	mg/kg
4-Chloro-3-methylphenol	<	200	mg/kg
2-Methylnaphthalene	<	100	mg/kg
Hexachlorocyclopentadiene	<	100	mg/kg
2,4,6-Trichlorophenol	<	100	mg/kg
2,4,5-Trichlorophenol	<	100	mg/kg
2-Chloronaphthalene	<	100	mg/kg
2-Nitroaniline	<	500	mg/kg
Dimethyl Phthalate	<	100	mg/kg
Acenaphthylene	<	100	mg/kg
3-Nitroaniline	<	500	mg/kg
Acenaphthene	<	100	mg/kg
2,4-Dinitrophenol	<	500	mg/kg
4-Nitrophenol	<	500	mg/kg
Dibenzofuran	<	100	mg/kg

< = Compound not detected at or above the listed reporting limit.

Semivolatile Organic Compounds - EPA Method 8270
Continued

VISTA Sample ID: 935805-008 Upper

Analyte	Result	Reporting Limit	Units
2,4-Dinitrotoluene	<	100	mg/kg
2,6-Dinitrotoluene	<	100	mg/kg
Diethyl Phthalate	<	100	mg/kg
4-Chlorophenyl Phenyl Ether	<	100	mg/kg
Fluorene	<	100	mg/kg
4-Nitroaniline	<	500	mg/kg
4,6-Dinitro-2-methylphenol	<	500	mg/kg
N-Nitrosodiphenylamine	<	100	mg/kg
4-Bromophenyl Phenyl Ether	<	100	mg/kg
Hexachlorobenzene	<	100	mg/kg
Pentachlorophenol	<	500	mg/kg
Phenanthrene	<	100	mg/kg
Anthracene	<	100	mg/kg
Di-n-butyl Phthalate	<	100	mg/kg
Fluoranthene	<	100	mg/kg
Pyrene	<	100	mg/kg
Butylbenzyl Phthalate	<	100	mg/kg
3,3'-Dichlorobenzidine	<	200	mg/kg
Benzo(a)anthracene	<	100	mg/kg
Bis(2-Ethylhexyl) Phthalate	<	100	mg/kg
Chrysene	<	100	mg/kg
Di-n-octyl Phthalate	<	100	mg/kg
Benzo(b)fluoranthene	<	100	mg/kg
Benzo(k)fluoranthene	<	100	mg/kg
Benzo(a)pyrene	<	100	mg/kg
Indeno(1,2,3-cd)pyrene	<	100	mg/kg
Dibenz(a,h)anthracene	<	100	mg/kg
Benzo(g,h,i)perylene	<	100	mg/kg

Surrogate Recoveries		QC Limits
Nitrobenzene-d_5	101 %	33-119
2-Fluorobiphenyl	118 %	27-114
Terphenyl-d_{14}	131 *	44-131
Phenol-d_6	84 %	33-131
2-Fluorophenol	85 %	19-141
2,4,6-Tribromophenol	112 %	14-136

< = Compound not detected at or above the listed reporting limit.

Semivolatile Organic Compounds - EPA Method 8270

Client: Soil Tech
Client Sample ID: 18.910-46532-4S-L1(W)
VISTA Sample ID: 935805-008 Lower Sample Type: Waste
Date Sampled : 01/28/93 Date Received: 01/29/93
Date Extracted: 02/03/93 Date Analyzed: 02/04/93

Analyte	Result	Reporting Limit	Units
Phenol	1,600	100	mg/kg
Bis(2-Chloroethyl) Ether	<	100	mg/kg
2-Chlorophenol	<	100	mg/kg
1,3-Dichlorobenzene	<	100	mg/kg
1,4-Dichlorobenzene	<	100	mg/kg
Benzyl Alcohol	<	200	mg/kg
1,2-Dichlorobenzene	<	100	mg/kg
2-Methylphenol	<	100	mg/kg
Bis(2-Chloroisopropyl) Ether	<	100	mg/kg
4-Methylphenol	<	100	mg/kg
N-Nitroso-di-n-propylamine	<	100	mg/kg
Hexachloroethane	<	100	mg/kg
Nitrobenzene	<	100	mg/kg
Isophorone	4,300	1,000	mg/kg
2-Nitrophenol	<	100	mg/kg
2,4-Dimethylphenol	<	100	mg/kg
Benzoic Acid	(360)*	500	mg/kg
Bis(2-Chloroethoxy)methane	<	100	mg/kg
2,4-Dichlorophenol	<	100	mg/kg
1,2,4-Trichlorobenzene	<	100	mg/kg
Naphthalene	850	100	mg/kg
4-Chloroaniline	<	200	mg/kg
Hexachlorobutadiene	<	100	mg/kg
4-Chloro-3-methylphenol	<	200	mg/kg
2-Methylnaphthalene	210	100	mg/kg
Hexachlorocyclopentadiene	<	100	mg/kg
2,4,6-Trichlorophenol	<	100	mg/kg
2,4,5-Trichlorophenol	<	100	mg/kg
2-Chloronaphthalene	(60)*	100	mg/kg
2-Nitroaniline	<	500	mg/kg
Dimethyl Phthalate	<	100	mg/kg
Acenaphthylene	<	100	mg/kg
3-Nitroaniline	<	500	mg/kg
Acenaphthene	120	100	mg/kg
2,4-Dinitrophenol	<	500	mg/kg
4-Nitrophenol	<	500	mg/kg
Dibenzofuran	770	1,000	mg/kg

* Detected below reporting limit; quantitation may be unreliable.
< = Compound not detected at or above the listed reporting limit.

Semivolatile Organic Compounds - EPA Method 8270
Continued

VISTA Sample ID: 935805-008 Lower

Analyte	Result	Reporting Limit	Units
2,4-Dinitrotoluene	<	100	mg/kg
2,6-Dinitrotoluene	<	100	mg/kg
Diethyl Phthalate	<	100	mg/kg
4-Chlorophenyl Phenyl Ether	<	100	mg/kg
Fluorene	110	100	mg/kg
4-Nitroaniline	<	500	mg/kg
4,6-Dinitro-2-methylphenol	<	500	mg/kg
N-Nitrosodiphenylamine	<	100	mg/kg
4-Bromophenyl Phenyl Ether	<	100	mg/kg
Hexachlorobenzene	<	100	mg/kg
Pentachlorophenol	<	500	mg/kg
Phenanthrene	130	100	mg/kg
Anthracene	(65)*	100	mg/kg
Di-n-butyl Phthalate	<	100	mg/kg
Fluoranthene	(93)*	100	mg/kg
Pyrene	(49)*	100	mg/kg
Butylbenzyl Phthalate	<	100	mg/kg
3,3'-Dichlorobenzidine	<	200	mg/kg
Benzo(a)anthracene	(33)*	100	mg/kg
Bis(2-Ethylhexyl) Phthalate	2,200	1,000	mg/kg
Chrysene	(32)*	100	mg/kg
Di-n-octyl Phthalate	<	100	mg/kg
Benzo(b)fluoranthene	(14)*	100	mg/kg
Benzo(k)fluoranthene	<	100	mg/kg
Benzo(a)pyrene	<	100	mg/kg
Indeno(1,2,3-cd)pyrene	<	100	mg/kg
Dibenz(a,h)anthracene	<	100	mg/kg
Benzo(g,h,i)perylene	<	100	mg/kg

Surrogate Recoveries		QC Limits
Nitrobenzene-d_5	126 %	32-119
2-Fluorobiphenyl	106 %	37-114
Terphenyl-d_{14}	112 %	44-111
Phenol-d_6	107 %	10-101
2-Fluorophenol	74 %	10-101
2,4,6-Tribromophenol	101 %	10-123

* Detected below reporting limit; quantitation may be unreliable.
< = Compound not detected at or above the listed reporting limit.

QUALITY ASSURANCE

Total Recoverable Petroleum Hydrocarbons
EPA Method 418.1

Client: Soil Tech
Client Sample ID: NA
VISTA Sample ID: 935805-Blank
Date Sampled : NA
Date Extracted: 02/09/93

Sample Type: Soil
Date Received: NA
Date Analyzed: 02/09/93

Analyte	Result	Reporting Limit	Units
TRPH	<	40	mg/kg

NA = Not Applicable
< = Compound not detected at or above the listed reporting limit.

Quality Assurance
Total Recoverable Petroleum Hydrocarbons - EPA Method 418.1
Matrix Spike Recovery and Precision

Client: Soil Tech
Client Sample ID: 18.9-46532-4S-S2H
VISTA Sample ID: 935805-005 Sample Type: Soil
Date Sampled : 01/28/93 Date Received: 01/29/93
Date Extracted: 02/09/93 Date Analyzed: 02/09/93

Compound	Spike Added (mg/kg)	Sample Conc. (mg/kg)	MS Conc. (mg/kg)	MS % Rec	QC Limits % Rec
TRPH	500	ND	394	79	75-125

Compound	Spike Added (mg/kg)	MSD Conc. (mg/kg)	MSD % Rec	RPD	QC Limits RPD	QC Limits % Rec
TRPH	500	394	79	0	15	75-125

ND = Not Detected
MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference

Quality Assurance
Total Recoverable Petroleum Hydrocarbons - Method 418.1
Laboratory Control Sample

Client: Soil Tech
VISTA Sample ID: 935805-LCS
Date Extracted: 02/09/93 Date Analyzed: 02/09/93

Compound	True Value (mg/kg)	Sample Result (mg/kg)	% Rec	QC Limits % Rec
TRPH	500	397	79	75-125

Polychlorinated Biphenyls
EPA Method 8080

Client: Soil Tech
Client Sample ID: NA
VISTA Sample ID: 935805-Blank
Sample Type: Soil
Date Sampled : NA
Date Received: NA
Date Extracted: 02/03/93
Date Analyzed: 02/03/93

Analyte	Result	Reporting Limit	Units
PCB-1016	<	0.10	mg/kg
PCB-1221	<	0.10	mg/kg
PCB-1232	<	0.07	mg/kg
PCB-1242	<	0.03	mg/kg
PCB-1248	<	0.03	mg/kg
PCB-1254	<	0.03	mg/kg
PCB-1260	<	0.03	mg/kg

NA = Not Applicable
< = Compound not detected at or above the listed reporting limit.

Quality Assurance
Polychlorinated Biphenyls - EPA Method 8080
Matrix Spike Recovery and Precision

Client: Soil Tech
Client Sample ID: NA
VISTA Sample ID: NA
Date Sampled : NA
Date Extracted: 02/03/93

Sample Type: Soil
Date Received: NA
Date Analyzed: 02/03/93

Compound	Spike Added (mg/kg)	Sample Conc. (mg/kg)	MS Conc. (mg/kg)	MS % Rec	QC Limits % Rec
Aroclor 1254	0.167	ND	0.176	105	50-160

Compound	Spike Added (mg/kg)	MSD Conc. (mg/kg)	MSD % Rec	RPD	QC Limits RPD	QC Limits % Rec
Aroclor 1254	0.167	0.184	110	5	38	50-1[illegible]

NA = Not Applicable
ND = Not Detected
MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference

Quality Assurance
Polychlorinated Biphenyls - EPA Method 8080
Matrix Spike Recovery and Precision

Client: Soil Tech
VISTA Sample ID: 935805-LCS
Date Extracted: 02/03/93 Date Analyzed: 02/03/93

Compound	True Value (mg/kg)	Sample Result (mg/kg)	% Rec	QC Limits % Rec
Aroclor 1254	0.167	0.172	103	50-160

Volatile Organic Compounds - EPA Method 8240

Client: Soil Tech
Client Sample ID: NA
VISTA Sample ID: 935805-Blank Sample Type: Water
Date Sampled : NA Date Received: NA
Date Analyzed: 02/10/93

Analyte	Result	Reporting Limit	Units
Chloromethane	<	10	ug/L
Bromomethane	<	10	ug/L
Vinyl Chloride	<	10	ug/L
Chloroethane	<	10	ug/L
Methylene Chloride	<	5	ug/L
Acetone	(4.3)*	100	ug/L
Carbon Disulfide	<	5	ug/L
1,1-Dichloroethene	<	5	ug/L
1,1-Dichloroethane	<	5	ug/L
1,2-Dichloroethenes, total	<	5	ug/L
Chloroform	(1.2)*	5	ug/L
1,2-Dichloroethane	<	5	ug/L
2-Butanone	<	100	ug/L
1,1,1-Trichloroethane	<	5	ug/L
Carbon Tetrachloride	<	5	ug/L
Vinyl Acetate	<	50	ug/L
Bromodichloromethane	<	5	ug/L
1,2-Dichloropropane	<	5	ug/L
Trans-1,3-Dichloropropene	<	5	ug/L
Trichloroethene	<	5	ug/L
Dibromochloromethane	<	5	ug/L
1,1,2-Trichloroethane	<	5	ug/L
Benzene	<	5	ug/L
Cis-1,3-Dichloropropene	<	5	ug/L
2-Chloroethyl Vinyl Ether	<	10	ug/L
Bromoform	<	5	ug/L
4-Methyl-2-Pentanone	<	50	ug/L
2-Hexanone	<	50	ug/L
Tetrachloroethene	<	5	ug/L
1,1,2,2-Tetrachloroethane	<	5	ug/L
Toluene	<	5	ug/L
Chlorobenzene	<	5	ug/L
Ethylbenzene	<	5	ug/L
Styrene	<	5	ug/L
Xylenes, total	<	5	ug/L

Surrogate Recoveries		QC Limits
Toluene-d_8	[illegible]	[illegible]
4-Bromofluorobenzene	[illegible]	[illegible]
1,2-Dichloroethane-d_4	[illegible]	[illegible]

NA = Not Applicable
* Detected below reporting limit; quantitation may be unreliable.
< = Compound not detected at or above the stated reporting limit.

Volatile Organic Compounds - EPA Method 8240

Client: Soil Tech
Client Sample ID: NA
VISTA Sample ID: 935805-Blank Sample Type: Water
Date Sampled : NA Date Received: NA
Date Analyzed: 02/11/93

Analyte	Result	Reporting Limit	Units
Chloromethane	<	10	ug/L
Bromomethane	<	10	ug/L
Vinyl Chloride	<	10	ug/L
Chloroethane	<	10	ug/L
Methylene Chloride	<	5	ug/L
Acetone	(11)*	100	ug/L
Carbon Disulfide	<	5	ug/L
1,1-Dichloroethene	<	5	ug/L
1,1-Dichloroethane	<	5	ug/L
1,2-Dichloroethenes, total	<	5	ug/L
Chloroform	<	5	ug/L
1,2-Dichloroethane	<	5	ug/L
2-Butanone	(1.2)*	100	ug/L
1,1,1-Trichloroethane	<	5	ug/L
Carbon Tetrachloride	<	5	ug/L
Vinyl Acetate	<	50	ug/L
Bromodichloromethane	<	5	ug/L
1,2-Dichloropropane	<	5	ug/L
Trans-1,3-Dichloropropene	<	5	ug/L
Trichloroethene	<	5	ug/L
Dibromochloromethane	<	5	ug/L
1,1,2-Trichloroethane	<	5	ug/L
Benzene	<	5	ug/L
Cis-1,3-Dichloropropene	<	5	ug/L
2-Chloroethyl Vinyl Ether	<	10	ug/L
Bromoform	<	5	ug/L
4-Methyl-2-Pentanone	<	50	ug/L
2-Hexanone	<	50	ug/L
Tetrachloroethene	<	5	ug/L
1,1,2,2-Tetrachloroethane	<	5	ug/L
Toluene	<	5	ug/L
Chlorobenzene	<	5	ug/L
Ethylbenzene	<	5	ug/L
Styrene	<	5	ug/L
Xylenes, total	<	5	ug/L

Surrogate Recoveries		QC Limits
Toluene-d_8	91	81-129
4-Bromofluorobenzene	97	74-112
1,2-Dichloroethane-d_4	87	75-110

NA = Not Applicable
* Detected below reporting limit; quantitation may be unreliable.
< = Compound not detected at or above the listed reporting limit.

Quality Assurance
Volatile Organics - EPA Method 8240
Matrix Spike Recovery and Precision

Client: Soil Tech
Client Sample ID: 18.6-46522-3S-SDH
VISTA Sample ID: 935805-003 Sample Type: Soil
Date Sampled : 01/28/93 Date Received: 01/29/93
Date Analyzed: 02/10/93

Compound	Spike Added (ug/kg)	Sample Conc. (ug/kg)	MS Conc. (ug/kg)	MS % Rec	QC Limits % Rec
1,1-Dichloroethene	5000	ND	4370	87	43-132
Benzene	5000	ND	5930	119	76-133
Trichloroethene	5000	ND	5360	107	81-119
Toluene	5000	120	5680	111	71-134
Chlorobenzene	5000	ND	5820	116	85-118

Compound	Spike Added (ug/kg)	MSD Conc. (ug/kg)	MSD % Rec	RPD	QC Limits RPD	QC Limits % Rec
1,1-Dichloroethene	5000	4390	88	1	12	43-132
Benzene	5000	6090	126	6	[illegible]	76-133
Trichloroethene	5000	5630	111	4	6	81-119
Toluene	5000	6130	120	8	4	71-134
Chlorobenzene	5000	6130	123	5	6	85-118

ND = Not Detected
MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference

Quality Assurance
Volatile Organics - EPA Method 8240
Laboratory Control Sample

Client: Soil Tech
VISTA Sample ID: 935805-LCS
Date Analyzed: 02/10/93

Compound	True Value (ug/L)	Sample Result (ug/L)	% Rec	QC Limits % Rec
1,1-Dichloroethene	50	45.8	92	92-135
Benzene	50	59.1	118	75-119
Trichloroethene	50	55.5	111	94-123
Toluene	50	50.2	100	88-116
Chlorobenzene	50	57.5	115	86-119

Quality Assurance
Volatile Organics - EPA Method 8240
Matrix Spike Recovery and Precision

Client: Soil Tech
Client Sample ID: 18.67-46532-3S-I1
VISTA Sample ID: 935805-007 Sample Type: Waste
Date Sampled : 01/28/93 Date Received: 01/29/93
Date Analyzed: 02/11/93

Compound	Spike Added (mg/kg)	Sample Conc. (mg/kg)	MS Conc. (mg/kg)	MS % Rec	QC Limits % Rec
1,1-Dichloroethene	25,000	1,500	19,600	72	43-132
Benzene	25,000	21,000	25,600	18	76-133
Trichloroethene	25,000	7,000	27,300	81	81-119
Toluene	25,000	5,400	29,500	96	71-134
Chlorobenzene	25,000	ND	23,500	94	85-118

Compound	Spike Added (mg/kg)	MSD Conc. (mg/kg)	MSD % Rec	RPD	QC Limits RPD	QC Limits % Rec
1,1-Dichloroethene	25,000	21,800	81	12	11	43-132
Benzene	25,000	28,400	30	50	7	76-133
Trichloroethene	25,000	30,400	94	15	6	81-119
Toluene	25,000	34,700	117	20	4	71-134
Chlorobenzene	25,000	27,500	110	16	6	85-118

ND = Not Detected
MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference

Quality Assurance
Volatile Organics - EPA Method 8240
Laboratory Control Sample

Client: Soil Tech
VISTA Sample ID: 935805-LCS
Date Analyzed: 02/11/93

Compound	True Value (ug/L)	Sample Result (ug/L)	% Rec	QC Limits % Rec
1,1-Dichloroethene	50	46.5	93	92-135
Benzene	50	58.1	116	75-19
Trichloroethene	50	50.5	101	94-123
Toluene	50	55.5	111	88-116
Chlorobenzene	50	49.8	100	86-119

Semivolatile Organic Compounds - EPA Method 8270

Client: Soil Tech
Client Sample ID: NA
VISTA Sample ID: 935805-Blank
Date Sampled : NA
Date Extracted: 02/03/93

Sample Type: Waste
Date Received: NA
Date Analyzed: 02/04/93

Analyte	Result	Reporting Limit	Units
Phenol	<	100	mg/kg
Bis(2-Chloroethyl) Ether	<	100	mg/kg
2-Chlorophenol	<	100	mg/kg
1,3-Dichlorobenzene	<	100	mg/kg
1,4-Dichlorobenzene	<	100	mg/kg
Benzyl Alcohol	<	200	mg/kg
1,2-Dichlorobenzene	<	100	mg/kg
2-Methylphenol	<	100	mg/kg
Bis(2-Chloroisopropyl) Ether	<	100	mg/kg
4-Methylphenol	<	100	mg/kg
N-Nitroso-di-n-propylamine	<	100	mg/kg
Hexachloroethane	<	100	mg/kg
Nitrobenzene	<	100	mg/kg
Isophorone	<	100	mg/kg
2-Nitrophenol	<	100	mg/kg
2,4-Dimethylphenol	<	100	mg/kg
Benzoic Acid	<	500	mg/kg
Bis(2-Chloroethoxy)methane	<	100	mg/kg
2,4-Dichlorophenol	<	100	mg/kg
1,2,4-Trichlorobenzene	<	100	mg/kg
Naphthalene	<	100	mg/kg
4-Chloroaniline	<	200	mg/kg
Hexachlorobutadiene	<	100	mg/kg
4-Chloro-3-methylphenol	<	200	mg/kg
2-Methylnaphthalene	<	100	mg/kg
Hexachlorocyclopentadiene	<	100	mg/kg
2,4,6-Trichlorophenol	<	100	mg/kg
2,4,5-Trichlorophenol	<	100	mg/kg
2-Chloronaphthalene	<	100	mg/kg
2-Nitroaniline	<	500	mg/kg
Dimethyl Phthalate	<	100	mg/kg
Acenaphthylene	<	100	mg/kg
3-Nitroaniline	<	500	mg/kg
Acenaphthene	<	100	mg/kg
2,4-Dinitrophenol	<	500	mg/kg
4-Nitrophenol	<	500	mg/kg
Dibenzofuran	<	100	mg/kg

NA = Not Applicable
< = Compound not detected at or above the listed reporting limit.

Semivolatile Organic Compounds - EPA Method 8270
continued

VISTA Sample ID: 935805-Blank

Analyte	Result	Reporting Limit	Units
2,4-Dinitrotoluene	<	100	mg/kg
2,6-Dinitrotoluene	<	100	mg/kg
Diethyl Phthalate	<	100	mg/kg
4-Chlorophenyl Phenyl Ether	<	100	mg/kg
Fluorene	<	100	mg/kg
4-Nitroaniline	<	500	mg/kg
4,6-Dinitro-2-methylphenol	<	500	mg/kg
N-Nitrosodiphenylamine	<	100	mg/kg
4-Bromophenyl Phenyl Ether	<	100	mg/kg
Hexachlorobenzene	<	100	mg/kg
Pentachlorophenol	<	500	mg/kg
Phenanthrene	<	100	mg/kg
Anthracene	<	100	mg/kg
Di-n-butyl Phthalate	<	100	mg/kg
Fluoranthene	<	100	mg/kg
Pyrene	<	100	mg/kg
Butylbenzyl Phthalate	<	100	mg/kg
3,3'-Dichlorobenzidine	<	200	mg/kg
Benzo(a)anthracene	<	100	mg/kg
Bis(2-Ethylhexyl) Phthalate	<	100	mg/kg
Chrysene	<	100	mg/kg
Di-n-octyl Phthalate	<	100	mg/kg
Benzo(b)fluoranthene	<	100	mg/kg
Benzo(k)fluoranthene	<	100	mg/kg
Benzo(a)pyrene	<	100	mg/kg
Indeno(1,2,3-cd)pyrene	<	100	mg/kg
Dibenz(a,h)anthracene	<	100	mg/kg
Benzo(g,h,i)perylene	<	100	mg/kg

Surrogate Recoveries		QC Limits
Nitrobenzene-d_5	100 %	32-118
2-Fluorobiphenyl	113 %	37-114
Terphenyl-d_{14}	107 %	44-101
Phenol-d_6	97 %	32-121
2-Fluorophenol	100 %	10-141
2,4,6-Tribromophenol	95 %	10-123

< = Compound not detected at or above the listed reporting limit.

Semivolatile Organic Compounds - EPA Method 8270

Client: Soil Tech
Client Sample ID: NA
VISTA Sample ID: 935805-Blank
Sample Type: Soil
Date Sampled : NA
Date Received: NA
Date Extracted: 02/11/93
Date Analyzed: 02/13/93

Analyte	Result	Reporting Limit	Units
Phenol	<	330	ug/kg
Bis(2-Chloroethyl) Ether	<	330	ug/kg
2-Chlorophenol	<	330	ug/kg
1,3-Dichlorobenzene	<	330	ug/kg
1,4-Dichlorobenzene	<	330	ug/kg
Benzyl Alcohol	<	660	ug/kg
1,2-Dichlorobenzene	<	330	ug/kg
2-Methylphenol	<	330	ug/kg
Bis(2-Chloroisopropyl) Ether	<	330	ug/kg
4-Methylphenol	<	330	ug/kg
N-Nitroso-di-n-propylamine	<	330	ug/kg
Hexachloroethane	<	330	ug/kg
Nitrobenzene	<	330	ug/kg
Isophorone	<	330	ug/kg
2-Nitrophenol	<	330	ug/kg
2,4-Dimethylphenol	<	330	ug/kg
Benzoic Acid	<	1,700	ug/kg
Bis(2-Chloroethoxy)methane	<	330	ug/kg
2,4-Dichlorophenol	<	330	ug/kg
1,2,4-Trichlorobenzene	<	330	ug/kg
Naphthalene	<	330	ug/kg
4-Chloroaniline	<	660	ug/kg
Hexachlorobutadiene	<	330	ug/kg
4-Chloro-3-methylphenol	<	660	ug/kg
2-Methylnaphthalene	<	330	ug/kg
Hexachlorocyclopentadiene	<	330	ug/kg
2,4,6-Trichlorophenol	<	330	ug/kg
2,4,5-Trichlorophenol	<	330	ug/kg
2-Chloronaphthalene	<	330	ug/kg
2-Nitroaniline	<	1,700	ug/kg
Dimethyl Phthalate	<	330	ug/kg
Acenaphthylene	<	330	ug/kg
3-Nitroaniline	<	1,700	ug/kg
Acenaphthene	<	330	ug/kg
2,4-Dinitrophenol	<	1,700	ug/kg
4-Nitrophenol	<	1,700	ug/kg
Dibenzofuran	<	330	ug/kg

NA = Not Applicable
< = Compound not detected at or above the listed reporting limit.

Semivolatile Organic Compounds - EPA Method 8270
(continued)

VISTA Sample ID: 935805-Blank

Analyte	Result	Reporting Limit	Units
2,4-Dinitrotoluene	<	330	ug/kg
2,6-Dinitrotoluene	<	330	ug/kg
Diethyl Phthalate	<	330	ug/kg
4-Chlorophenyl Phenyl Ether	<	330	ug/kg
Fluorene	<	330	ug/kg
4-Nitroaniline	<	1,700	ug/kg
4,6-Dinitro-2-methylphenol	<	1,700	ug/kg
N-Nitrosodiphenylamine	<	330	ug/kg
4-Bromophenyl Phenyl Ether	<	330	ug/kg
Hexachlorobenzene	<	330	ug/kg
Pentachlorophenol	<	1,700	ug/kg
Phenanthrene	<	330	ug/kg
Anthracene	<	330	ug/kg
Di-n-butyl Phthalate	<	330	ug/kg
Fluoranthene	<	330	ug/kg
Pyrene	<	330	ug/kg
Butylbenzyl Phthalate	<	330	ug/kg
3,3'-Dichlorobenzidine	<	660	ug/kg
Benzo(a)anthracene	<	330	ug/kg
Bis(2-Ethylhexyl) Phthalate	<	330	ug/kg
Chrysene	<	330	ug/kg
Di-n-octyl Phthalate	<	330	ug/kg
Benzo(b)fluoranthene	<	330	ug/kg
Benzo(k)fluoranthene	<	330	ug/kg
Benzo(a)pyrene	<	330	ug/kg
Indeno(1,2,3-cd)pyrene	<	330	ug/kg
Dibenz(a,h)anthracene	<	330	ug/kg
Benzo(g,h,i)perylene	<	330	ug/kg

Surrogate Recoveries		QC Limits
Nitrobenzene-d_5	73 %	35-90
2-Fluorobiphenyl	82 %	37-99
Terphenyl-d_{14}	105 %	57-109
Phenol-d_6	74 %	25-100
2-Fluorophenol	71 %	16-97
2,4,6-Tribromophenol	93 %	19-101

< = Compound not detected at or above the listed reporting limit.

Quality Assurance
Semivolatile Organics - EPA Method 8270
Matrix Spike Recovery and Precision

Client: Soil Tech
Client Sample ID: NA
VISTA Sample ID: 935805-BLSP
Sample Type: Waste
Date Sampled : NA
Date Received: NA
Date Extracted: 02/03/93
Date Analyzed: 02/10/93

Compound	Spike Added (ug/kg)	Sample Conc. (ug/kg)	MS Conc. (ug/kg)	MS % Rec	QC Limits % Rec
Phenol	400	ND	385	96	26-90
2-Chlorophenol	400	ND	385	96	25-102
1,4-Dichlorobenzene	200	ND	111	56	28-104
Di-n-propylnitrosamine	200	ND	202	101	41-126
1,2,4-Trichlorobenzene	200	ND	177	89	38-107
4-Chloro-3-methylphenol	400	ND	343	86	26-103
Acenaphthene	200	ND	177	89	31-137
4-Nitrophenol	400	ND	328	82	11-114
2,4-Dinitrotoluene	200	ND	162	81	28-89
Pentachlorophenol	400	ND	381	95	17-109
Pyrene	200	ND	204	102	35-142

Compound	Spike Added (ug/kg)	MSD Conc. (ug/kg)	MSD % Rec	RPD	QC Limits RPD	QC Limits % Rec
Phenol	400	375	94	2	35	26-90
2-Chlorophenol	400	379	95	1	50	25-102
1,4-Dichlorobenzene	200	112	56	0	27	28-104
Di-n-propylnitrosamine	200	200	100	1	38	41-126
1,2,4-Trichlorobenzene	200	196	98	10	23	38-107
4-Chloro-3-methylphenol	400	347	87	1	33	26-103
Acenaphthene	200	202	101	13	19	31-137
4-Nitrophenol	400	350	88	7	50	11-114
2,4-Dinitrotoluene	200	177	89	9	47	28-89
Pentachlorophenol	400	371	93	2	47	17-109
Pyrene	200	202	101	1	36	35-142

NA = Not Applicable
ND = Not Detected
MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference

Quality Assurance
Semivolatile Organics - EPA Method 8270
Matrix Spike Recovery and Precision

Client: Soil Tech
Client Sample ID: 18.7-46532-3S-S2L
VISTA Sample ID: 935805-004 Sample Type: Soil
Date Sampled : 01/28/93 Date Received: 01/29/93
Date Extracted: 02/11/93 Date Analyzed: 02/13/93

Compound	Spike Added (ug/kg)	Sample Conc. (ug/kg)	MS Conc. (ug/kg)	MS % Rec	QC Limits % Rec
Phenol	3330	ND	1950	59	20-96
2-Chlorophenol	3330	ND	1800	54	24-99
1,4-Dichlorobenzene	1670	ND	491	29	28-95
Di-n-propylnitrosamine	1670	ND	1300	78	22-112
1,2,4-Trichlorobenzene	1670	ND	1120	67	23-115
4-Chloro-3-methylphenol	3330	ND	2030	61	21-117
Acenaphthene	1670	ND	1450	87	22-144
4-Nitrophenol	3330	ND	0	0	10-126
2,4-Dinitrotoluene	1670	ND	1160	69	10-127
Pentachlorophenol	3330	ND	174	5	10-133
Pyrene	1670	ND	1160	69	10-127

Compound	Spike Added (ug/kg)	MSD Conc. (ug/kg)	MSD % Rec	RPD	QC Limits RPD	QC Limits % Rec
Phenol	3330	2030	61	3	21	20-96
2-Chlorophenol	3330	1840	55	2	19	24-99
1,4-Dichlorobenzene	1670	519	31	7	17	28-95
Di-n-propylnitrosamine	1670	1080	65	18	22	22-112
1,2,4-Trichlorobenzene	1670	1070	64	5	43	23-115
4-Chloro-3-methylphenol	3330	2070	62	2	33	21-117
Acenaphthene	1670	1460	87	0	19	22-144
4-Nitrophenol	3330	203	6	200	29	10-126
2,4-Dinitrotoluene	1670	1210	72	4	28	10-127
Pentachlorophenol	3330	535	16	105	47	10-133
Pyrene	1670	1210	72	4	33	10-127

ND = Not Detected
MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference

Quality Assurance
Semivolatile Organics - EPA Method 8270
Laboratory Control Sample

Client: Soil Tech
VISTA Sample ID: 935805-LCS
Date Extracted: 02/11/93 Date Analyzed: 02/13/93

Compound	True Value (ug/kg)	Sample Result (ug/kg)	% Rec	QC Limits % Rec
Phenol	3330	2430	73	5-112
2-Chlorophenol	3330	2370	71	23-134
1,4-Dichlorobenzene	1670	634	38	20-124
Di-n-propylnitrosamine	1670	1400	84	D-230
1,2,4-Trichlorobenzene	1670	1270	76	44-142
4-Chloro-3-methylphenol	3330	2450	74	22-147
Acenaphthene	1670	1240	74	47-145
4-Nitrophenol	3330	3070	92	D-132
2,4-Dinitrotoluene	1670	1390	83	39-139
Pentachlorophenol	3330	3200	96	14-176
Pyrene	1670	1530	92	52-115

D = Detected

Oil and Grease
Gravimetric - Modified EPA Method 9070

Client: Soil Tech
Client Sample ID: NA
VISTA Sample ID: 935805-Blank
Sample Type: Soil
Date Sampled : NA
Date Received: NA
Date Analyzed: 02/08/93

Analyte	Result	Reporting Limit	Units
Oil and Grease	<	50	mg/kg

NA = Not Applicable
< = Compound not detected at or above the listed reporting limit.

Quality Assurance
Oil and Grease - Modified EPA Method 9070
Matrix Spike Recovery and Precision

Client: Soil Tech
Client Sample ID: NA
VISTA Sample ID: 935805-BLSP
Sample Type: Soil
Date Sampled : NA
Date Received: NA
Date Analyzed: 02/08/93

Compound	Spike Added (mg/kg)	Sample Conc. (mg/kg)	MS Conc. (mg/kg)	MS % Rec	QC Limits % Rec
Oil and Grease (Motor Oil)	503	ND	540	107	35-141

Compound	Spike Added (mg/kg)	MSD Conc. (mg/kg)	MSD % Rec	RPD	QC Limits RPD	QC Limits % Rec
Oil and Grease (Motor Oil)	507	440	87	21	17	35-141

NA = Not Applicable
ND = Not Detected
MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference

HAZEN RESEARCH, INC.
4601 Indiana St. · Golden, CO 80403
Tel.: (303) 279 4501 · Telex 45-860

CHAIN OF CUSTODY RECORD

Proj No. 7632-16 | Project Name Soil Tech

Samplers (Signature)

Sta. No.	Date	Time	Comp.	Grab	Station Location	No. of Containers	TRPH	O&G	BTEX	VOC	SVOC	Sample Type	Remarks
	1-29-93				18.5 - 46532-35-S1	1	X	X				X	separate containers into oil and water for two tests being analyzed
					18.8 - 46532-45-S1	1	X	X				X	
					18.6 - 46532-35-S2H	1	X		X	X	X		
					18.7 - 46532-35-S2L	1	X		X	X	X		
					18.9 - 46532-45-S2H	1	X		X	X	X		* note Freon extract for the oil & grease procedure (TRPH) and then standard analysis on that layer
					18.10 - 46532-45-S2L	1	X		X	X	X		
					18.67 - 46532-35-L1	1							
					-L1(O)				X	X	X	X	
					-L1(W)				X	X	X		
					18.910 - 46532-45-L1	1							** TCLP on solid samples only
					-L1(O)				X	X	X	X	
					-L1(W)				X	X	X		
													If there are questions about this contact Peggy Walker 279-4532

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
	1/29/93 0900				
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time 1/29/93 1010	Received for laboratory by: (Signature)	Remarks:		

Distribution: White Copy - Ship With Sample; Canary Copy - Laboratory Copy; Pink Copy - Originator's Co

VISTA Laboratories Inc.

[illegible]
Broomfield, Colorado [illegible]
303 469 8868

January 8, 1993

Mr. Roger Nielson
Soil Tech
6300 South Syracuse
#300
Englewood, Colorado 80111

Dear Mr. Nielson:

Enclosed are the results from the analyses of three samples, received on December 28, 1992, for the determination of organochlorine pesticides/PCB's and semivolatile organic compounds. Please feel free to call if you have any questions regarding these analyses.

Sincerely,

Robert J. Keck
Laboratory Director

Reviewed by,

Gary Torr
Quality Assurance Director

RJK/GT:dab
Enclosures

VISTA Project # 92574

Sample Description

Laboratory ID	Client ID	Type	Date Received
925714-001	Hazen NO 46532-1	Soil/Waste	12/28/92
925714-002	Hazen NO 46532-3	Soil/Waste	12/28/92
925714-003	Hazen NO 46532-2	Soil/Waste	12/28/92

Results and Discussion

VISTA Project # 925714

Three samples were received on December 28, 1992, for the determination of organochlorine pesticides/PCB's and semivolatile organic compounds. The samples were analyzed according to the protocols described in USEPA SW-846, Test Methods for Evaluating Solid Waste, 3rd Ed., Methods 8080 and 8270.

The samples were reanalyzed for PCB's on January 7, 1993, after an acid cleanup procedure, in order to remove matrix interferences. Only AR1254 could be positively identified, due to the remaining interferences.

Organochlorine Pesticides/PCB's
EPA Method 8080

Client: Soil Tech
Client Sample ID: Hazen NO 46532-1
VISTA Sample ID: 925714-001 Sample Type: Waste
Date Sampled : 12/28/92 Date Received: 12/28/92
Date Extracted: 01/04/93 Date Analyzed: 01/04/93

Analyte	Result	Reporting Limit	Units
Aldrin	<	0.40	mg/kg
alpha-BHC	<	0.30	mg/kg
beta-BHC	<	0.60	mg/kg
delta-BHC	<	0.90	mg/kg
gamma-BHC (Lindane)	<	0.40	mg/kg
Chlordane	<	1.4	mg/kg
4,4'-DDD	1.9	1.1	mg/kg
4,4'-DDE	<	0.40	mg/kg
4,4'-DDT	2.2	1.2	mg/kg
Dieldrin	<	0.20	mg/kg
Endosulfan I	8.2	1.4	mg/kg
Endosulfan II	0.55	0.40	mg/kg
Endosulfan Sulfate	<	0.6	mg/kg
Endrin	<	0.60	mg/kg
Endrin Aldehyde	<	2.3	mg/kg
Endrin Ketone	<	0.30	mg/kg
HCCPD	<	0.30	mg/kg
Heptachlor	<	0.30	mg/kg
Heptachlor Epoxide	<	0.3	mg/kg
Isodrin	1.5	0.30	mg/kg
Methoxychlor	<	18	mg/kg
Toxaphene	<	24	mg/kg
PCB-1016	<	20	mg/kg
PCB-1221	<	20	mg/kg
PCB-1232	<	10	mg/kg
PCB-1242	<	6.5	mg/kg
PCB-1248	<	6.5	mg/kg
PCB-1254	50	6.5	mg/kg
PCB-1260	<	6.5	mg/kg

Surrogate Recoveries		QC Limits
Dibutyl Chlorendate DBC	107	11-141

< = Compound not detected at or above the listed reporting limit.

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 8270

Client: Soil Tech
Client Sample ID: Hazen NO 46632-1
VISTA Sample ID: 925714-001 Sample Type: Soil
Date Sampled : 12/28/92 Date Received: 12/28/92
Date Extracted: 12/30/92 Date Analyzed: 01/05/93

Analyte	Result	Reporting Limit	Units
Phenol	<	33	mg/kg
Bis(2-Chloroethyl) Ether	<	33	mg/kg
2-Chlorophenol	<	33	mg/kg
1,3-Dichlorobenzene	<	33	mg/kg
1,4-Dichlorobenzene	<	33	mg/kg
Benzyl Alcohol	<	66	mg/kg
1,2-Dichlorobenzene	<	33	mg/kg
2-Methylphenol	<	33	mg/kg
Bis(2-Chloroisopropyl) Ether	<	33	mg/kg
4-Methylphenol	<	33	mg/kg
N-Nitroso-di-n-propylamine	<	33	mg/kg
Hexachloroethane	<	33	mg/kg
Nitrobenzene	<	33	mg/kg
Isophorone	<	33	mg/kg
2-Nitrophenol	<	33	mg/kg
2,4-Dimethylphenol	<	33	mg/kg
Benzoic Acid	<	170	mg/kg
Bis(2-Chloroethoxy)methane	<	33	mg/kg
2,4-Dichlorophenol	<	33	mg/kg
1,2,4-Trichlorobenzene	<	33	mg/kg
Naphthalene	39	33	mg/kg
4-Chloroaniline	<	66	mg/kg
Hexachlorobutadiene	<	33	mg/kg
4-Chloro-3-methylphenol	<	66	mg/kg
2-Methylnaphthalene	62	33	mg/kg
Hexachlorocyclopentadiene	<	33	mg/kg
2,4,6-Trichlorophenol	<	33	mg/kg
2,4,5-Trichlorophenol	<	33	mg/kg
2-Chloronaphthalene	<	33	mg/kg
2-Nitroaniline	<	170	mg/kg
Dimethyl Phthalate	<	33	mg/kg
Acenaphthylene	<	33	mg/kg
3-Nitroaniline	<	170	mg/kg
Acenaphthene	<	33	mg/kg
2,4-Dinitrophenol	<	170	mg/kg
4-Nitrophenol	<	170	mg/kg
Dibenzofuran	<	33	mg/kg

< = Compound not detected at or above the listed reporting limit.

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 8270
(continued)

VISTA Sample ID: 925714-001

Analyte	Result	Reporting Limit	Units
2,4-Dinitrotoluene	<	33	mg/kg
2,6-Dinitrotoluene	<	33	mg/kg
Diethyl Phthalate	(8.3)*	33	mg/kg
4-Chlorophenyl Phenyl Ether	<	33	mg/kg
Fluorene	<	33	mg/kg
4-Nitroaniline	<	170	mg/kg
4,6-Dinitro-2-methylphenol	<	170	mg/kg
N-Nitrosodiphenylamine	<	33	mg/kg
4-Bromophenyl Phenyl Ether	<	33	mg/kg
Hexachlorobenzene	<	33	mg/kg
Pentachlorophenol	<	170	mg/kg
Phenanthrene	<	33	mg/kg
Anthracene	<	33	mg/kg
Di-n-butyl Phthalate	97	33.	mg/kg
Fluoranthene	<	33	mg/kg
Pyrene	<	33	mg/kg
Butylbenzyl Phthalate	49	33	mg/kg
3,3'-Dichlorobenzidine	<	66	mg/kg
Benzo(a)anthracene	<	33	mg/kg
Bis(2-Ethylhexyl) Phthalate	210	33	mg/kg
Chrysene	<	33	mg/kg
Di-n-octyl Phthalate	<	33	mg/kg
Benzo(b)fluoranthene	<	33	mg/kg
Benzo(k)fluoranthene	<	33	mg/kg
Benzo(a)pyrene	<	33	mg/kg
Indeno(1,2,3-cd)pyrene	<	33	mg/kg
Dibenz(a,h)anthracene	<	33	mg/kg
Benzo(g,h,i)perylene	<	33	mg/kg

Surrogate Recoveries		QC Limits
Nitrobenzene-d_5	D	35-90
2-Fluorobiphenyl	D	37-99
Terphenyl-d_{14}	D	57-100
Phenol-d_6	D	36-100
2-Fluorophenol	D	10-97
2,4,6-Tribromophenol	D	10-111

* Detected below reporting limit; quantitation may be unreliable.
D = Diluted Out.
< = Compound not detected at or above the listed reporting limit.

Organochlorine Pesticides/PCB's
EPA Method 8080

Client: Soil Tech
Client Sample ID: Hazen NO 46532-1
VISTA Sample ID: 925714-002 Sample Type: Waste
Date Sampled : 12/28/92 Date Received: 12/28/92
Date Extracted: 01/04/93 Date Analyzed: 01/04/93

Analyte	Result	Reporting Limit	Units
Aldrin	<	0.40	mg/kg
alpha-BHC	0.74	0.30	mg/kg
beta-BHC	<	0.60	mg/kg
delta-BHC	<	0.90	mg/kg
gamma-BHC (Lindane)	<	0.40	mg/kg
Chlordane	<	1.4	mg/kg
4,4'-DDD	2.4	1.1	mg/kg
4,4'-DDE	<	0.40	mg/kg
4,4'-DDT	1.6	1.2	mg/kg
Dieldrin	3.1	0.20	mg/kg
Endosulfan I	3.2	1.4	mg/kg
Endosulfan II	<	0.40	mg/kg
Endosulfan Sulfate	<	6.6	mg/kg
Endrin	<	0.60	mg/kg
Endrin Aldehyde	<	2.3	mg/kg
Endrin Ketone	<	0.30	mg/kg
HCCPD	<	0.30	mg/kg
Heptachlor	1.3	0.30	mg/kg
Heptachlor Epoxide	<	3.3	mg/kg
Isodrin	1.4	0.30	mg/kg
Methoxychlor	<	18	mg/kg
Toxaphene	<	24	mg/kg
PCB-1016	<	20	mg/kg
PCB-1221	<	20	mg/kg
PCB-1232	<	13	mg/kg
PCB-1242	<	6.6	mg/kg
PCB-1248	<	6.6	mg/kg
PCB-1254	75	6.6	mg/kg
PCB-1260	<	6.6	mg/kg

Surrogate Recoveries		QC Limits
Dibutyl Chlorendate (DBC)	100	41-141

< = Compound not detected at or above the listed reporting limit.

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 8270

Client: Soil Tech
Client Sample ID: Hazen NO 46532-3
VISTA Sample ID: 925714-002 Sample Type: Soil
Date Sampled : 12/28/92 Date Received: 12/28/92
Date Extracted: 12/30/92 Date Analyzed: 01/05/93

Analyte	Result	Reporting Limit	Units
Phenol	36	17	mg/kg
Bis(2-Chloroethyl) Ether	<	17	mg/kg
2-Chlorophenol	<	17	mg/kg
1,3-Dichlorobenzene	<	17	mg/kg
1,4-Dichlorobenzene	<	17	mg/kg
Benzyl Alcohol	<	33	mg/kg
1,2-Dichlorobenzene	(4.4)*	17	mg/kg
2-Methylphenol	9.5	17	mg/kg
Bis(2-Chloroisopropyl) Ether	<	17	mg/kg
4-Methylphenol	24	17	mg/kg
N-Nitroso-di-n-propylamine	<	17	mg/kg
Hexachloroethane	<	17	mg/kg
Nitrobenzene	<	17	mg/kg
Isophorone	46	17	mg/kg
2-Nitrophenol	<	17	mg/kg
2,4-Dimethylphenol	<	17	mg/kg
Benzoic Acid	<	85	mg/kg
Bis(2-Chloroethoxy)methane	<	17	mg/kg
2,4-Dichlorophenol	<	17	mg/kg
1,2,4-Trichlorobenzene	<	17	mg/kg
Naphthalene	59	17	mg/kg
4-Chloroaniline	<	33	mg/kg
Hexachlorobutadiene	<	17	mg/kg
4-Chloro-3-methylphenol	<	33	mg/kg
2-Methylnaphthalene	25	17	mg/kg
Hexachlorocyclopentadiene	<	17	mg/kg
2,4,6-Trichlorophenol	<	17	mg/kg
2,4,5-Trichlorophenol	<	17	mg/kg
2-Chloronaphthalene	<	17	mg/kg
2-Nitroaniline	<	85	mg/kg
Dimethyl Phthalate	(8.7)*	17	mg/kg
Acenaphthylene	<	17	mg/kg
3-Nitroaniline	<	85	mg/kg
Acenaphthene	<	17	mg/kg
2,4-Dinitrophenol	<	85	mg/kg
4-Nitrophenol	<	85	mg/kg
Dibenzofuran	<	17	mg/kg

* Detected below reporting limit; quantitation may be unreliable.
< = Compound not detected at or above the listed reporting limit.

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 8270
(Continued)

VISTA Sample ID: 925714-002

Analyte	Result	Reporting Limit	Units
2,4-Dinitrotoluene	<	17	mg/kg
2,6-Dinitrotoluene	<	17	mg/kg
Diethyl Phthalate	<	17	mg/kg
4-Chlorophenyl Phenyl Ether	<	17	mg/kg
Fluorene	<	17	mg/kg
4-Nitroaniline	<	85	mg/kg
4,6-Dinitro-2-methylphenol	<	85	mg/kg
N-Nitrosodiphenylamine	<	17	mg/kg
4-Bromophenyl Phenyl Ether	<	17	mg/kg
Hexachlorobenzene	<	17	mg/kg
Pentachlorophenol	<	85	mg/kg
Phenanthrene	<	17	mg/kg
Anthracene	<	17	mg/kg
Di-n-butyl Phthalate	54	17	mg/kg
Fluoranthene	<	17	mg/kg
Pyrene	<	17	mg/kg
Butylbenzyl Phthalate	16	17	mg/kg
3,3'-Dichlorobenzidine	<	33	mg/kg
Benzo(a)anthracene	<	17	mg/kg
Bis(2-Ethylhexyl) Phthalate	140	17	mg/kg
Chrysene	<	17	mg/kg
Di-n-octyl Phthalate	<	17	mg/kg
Benzo(b)fluoranthene	<	17	mg/kg
Benzo(k)fluoranthene	<	17	mg/kg
Benzo(a)pyrene	<	17	mg/kg
Indeno(1,2,3-cd)pyrene	<	17	mg/kg
Dibenz(a,h)anthracene	<	17	mg/kg
Benzo(g,h,i)perylene	<	17	mg/kg

Surrogate Recoveries		2D Limits
Nitrobenzene-d_5	D	35-90
2-Fluorobiphenyl	D	27-95
Terphenyl-d_{14}	D	37-123
Phenol-d_6	D	25-121
2-Fluorophenol	D	16-97
2,4,6-Tribromophenol	D	19-122

D = Diluted Out.
< = Compound not detected at or above the listed reporting limit.

Organochlorine Pesticides/PCB's
EPA Method 8080

Client: Soil Tech
Client Sample ID: Hazen NC 46532-2
VISTA Sample ID: 925714-003 Sample Type: Waste
Date Sampled : 12/28/92 Date Received: 12/28/92
Date Extracted: 01/04/93 Date Analyzed: 01/04/93

Analyte	Result	Reporting Limit	Units
Aldrin	0.81	0.40	mg/kg
alpha-BHC	<	0.30	mg/kg
beta-BHC	<	0.60	mg/kg
delta-BHC	<	0.90	mg/kg
gamma-BHC (Lindane)	<	0.40	mg/kg
Chlordane	<	1.4	mg/kg
4,4'-DDD	<	1.1	mg/kg
4,4'-DDE	<	0.40	mg/kg
4,4'-DDT	3.2	1.2	mg/kg
Dieldrin	10	0.20	mg/kg
Endosulfan I	22	1.4	mg/kg
Endosulfan II	0.46	0.40	mg/kg
Endosulfan Sulfate	<	6.6	mg/kg
Endrin	<	0.60	mg/kg
Endrin Aldehyde	<	2.3	mg/kg
Endrin Ketone	<	0.30	mg/kg
HCCPD	<	0.30	mg/kg
Heptachlor	0.51	0.30	mg/kg
Heptachlor Epoxide	<	8.3	mg/kg
Isodrin	2.3	0.30	mg/kg
Methoxychlor	<	18	mg/kg
Toxaphene	<	24	mg/kg
PCB-1016	<	20	mg/kg
PCB-1221	<	20	mg/kg
PCB-1232	<	13	mg/kg
PCB-1242	<	6.5	mg/kg
PCB-1248	<	6.5	mg/kg
PCB-1254	77	6.5	mg/kg
PCB-1260	<	6.5	mg/kg

Surrogate Recoveries		QC Limits
Dibutyl Chlorendate (DBC)	91 %	41-141

< = Compound not detected at or above the listed reporting limit.

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 8270

Client: Soil Tech
Client Sample ID: Hazen NO 46632-2
VISTA Sample ID: 925714-003 Sample Type: Soil
Date Sampled : 12/28/92 Date Received: 12/28/92
Date Extracted: 12/30/92 Date Analyzed: 01/05/93

Analyte	Result	Reporting Limit	Units
Phenol	150	33	mg/kg
Bis(2-Chloroethyl) Ether	<	33	mg/kg
2-Chlorophenol	<	33	mg/kg
1,3-Dichlorobenzene	<	33	mg/kg
1,4-Dichlorobenzene	<	33	mg/kg
Benzyl Alcohol	<	66	mg/kg
1,2-Dichlorobenzene	<	33	mg/kg
2-Methylphenol	(10)*	33	mg/kg
Bis(2-Chloroisopropyl) Ether	<	33	mg/kg
4-Methylphenol	(21)*	33	mg/kg
N-Nitroso-di-n-propylamine	<	33	mg/kg
Hexachloroethane	<	33	mg/kg
Nitrobenzene	<	33	mg/kg
Isophorone	150	33	mg/kg
2-Nitrophenol	<	33	mg/kg
2,4-Dimethylphenol	(10)*	33	mg/kg
Benzoic Acid	<	170	mg/kg
Bis(2-Chloroethoxy)methane	<	33	mg/kg
2,4-Dichlorophenol	<	33	mg/kg
1,2,4-Trichlorobenzene	<	33	mg/kg
Naphthalene	130	33	mg/kg
4-Chloroaniline	<	66	mg/kg
Hexachlorobutadiene	(7)*	33	mg/kg
4-Chloro-3-methylphenol	<	66	mg/kg
2-Methylnaphthalene	64	33	mg/kg
Hexachlorocyclopentadiene	<	33	mg/kg
2,4,6-Trichlorophenol	<	33	mg/kg
2,4,5-Trichlorophenol	<	33	mg/kg
2-Chloronaphthalene	<	33	mg/kg
2-Nitroaniline	<	170	mg/kg
Dimethyl Phthalate	(2)*	33	mg/kg
Acenaphthylene	<	33	mg/kg
3-Nitroaniline	<	170	mg/kg
Acenaphthene	<	33	mg/kg
2,4-Dinitrophenol	<	170	mg/kg
4-Nitrophenol	<	170	mg/kg
Dibenzofuran	<	33	mg/kg

* Detected below reporting limit; quantitation may be unreliable.
< = Compound not detected at or above the listed reporting limit.

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 8270
(continued)

VISTA Sample ID: 925714-003

Analyte	Result	Reporting Limit	Units
2,4-Dinitrotoluene	<	33	mg/kg
2,6-Dinitrotoluene	<	33	mg/kg
Diethyl Phthalate	6.6	33	mg/kg
4-Chlorophenyl Phenyl Ether	<	33	mg/kg
Fluorene	<	33	mg/kg
4-Nitroaniline	<	170	mg/kg
4,6-Dinitro-2-methylphenol	<	170	mg/kg
N-Nitrosodiphenylamine	<	33	mg/kg
4-Bromophenyl Phenyl Ether	<	33	mg/kg
Hexachlorobenzene	<	33	mg/kg
Pentachlorophenol	<	170	mg/kg
Phenanthrene	(3.3)*	33	mg/kg
Anthracene	<	33	mg/kg
Di-n-butyl Phthalate	71	33	mg/kg
Fluoranthene	<	33	mg/kg
Pyrene	<	33	mg/kg
Butylbenzyl Phthalate	51	33	mg/kg
3,3'-Dichlorobenzidine	<	66	mg/kg
Benzo(a)anthracene	<	33	mg/kg
Bis(2-Ethylhexyl) Phthalate	210	33	mg/kg
Chrysene	<	33	mg/kg
Di-n-octyl Phthalate	<	33	mg/kg
Benzo(b)fluoranthene	<	33	mg/kg
Benzo(k)fluoranthene	<	33	mg/kg
Benzo(a)pyrene	<	33	mg/kg
Indeno(1,2,3-cd)pyrene	<	33	mg/kg
Dibenz(a,h)anthracene	<	33	mg/kg
Benzo(g,h,i)perylene	<	33	mg/kg

Surrogate Recoveries		QC Limits
Nitrobenzene-d_5	D	35-93
2-Fluorobiphenyl	D	27-99
Terphenyl-d_{14}	D	37-109
Phenol-d_6	D	24-102
2-Fluorophenol	D	16-97
2,4,6-Tribromophenol	D	11-131

* Detected below reporting limit; quantitation may be unreliable.
D = Diluted Out.
< = Compound not detected at or above the listed reporting limit.

QUALITY ASSURANCE

Organochlorine Pesticides/PCB's
EPA Method 8080

Client: Soil Tech
Client Sample ID: NA
VISTA Sample ID: 925714-Blank
Sample Type: Waste
Date Sampled : NA
Date Received: NA
Date Extracted: 01/04/93
Date Analyzed: 01/04/93

Analyte	Result	Reporting Limit	Units
Aldrin	<	0.40	mg/kg
alpha-BHC	<	0.30	mg/kg
beta-BHC	<	0.60	mg/kg
delta-BHC	<	0.90	mg/kg
gamma-BHC (Lindane)	<	0.40	mg/kg
Chlordane	<	1.4	mg/kg
4,4'-DDD	<	1.1	mg/kg
4,4'-DDE	<	0.40	mg/kg
4,4'-DDT	<	1.2	mg/kg
Dieldrin	<	0.20	mg/kg
Endosulfan I	<	1.4	mg/kg
Endosulfan II	<	0.40	mg/kg
Endosulfan Sulfate	<	6.6	mg/kg
Endrin	<	0.60	mg/kg
Endrin Aldehyde	<	2.3	mg/kg
Endrin Ketone	<	0.30	mg/kg
HCCPD	<	0.30	mg/kg
Heptachlor	<	0.30	mg/kg
Heptachlor Epoxide	<	8.3	mg/kg
Isodrin	<	0.30	mg/kg
Methoxychlor	<	18	mg/kg
Toxaphene	<	24	mg/kg
PCB-1016	<	33	mg/kg
PCB-1221	<	20	mg/kg
PCB-1232	<	13	mg/kg
PCB-1242	<	6.5	mg/kg
PCB-1248	<	6.5	mg/kg
PCB-1254	<	6.5	mg/kg
PCB-1260	<	6.5	mg/kg

Surrogate Recoveries		QC Limits
Dibutyl Chlorendate (DBC	[illegible]	41-14[illegible]
TCMX	[illegible]	41-11[illegible]

NA = Not Applicable
< = Compound not detected at or above the listed reporting limit.

Quality Assurance
Organochlorine Pesticides - Method 8080
Matrix Spike Recovery and Precision

Client: Soil Tech
Client Sample ID: NA
VISTA Sample ID: 925714-BLSP — Sample Type: Waste
Date Sampled : NA — Date Received: NA
Date Extracted: 01/04/93 — Date Analyzed: 01/04/93

Compound	Spike Added (mg/kg)	Sample Conc. (mg/kg)	MS Conc. (mg/kg)	MS % Rec	QC Limits % Rec
gamma-BHC (Lindane)	0.331	ND	0.293	89	36-122
Heptachlor	0.313	ND	0.273	87	42-126
Aldrin	0.268	ND	0.236	88	39-117
Dieldrin	0.586	ND	0.515	88	43-105
Endrin	0.604	ND	0.545	90	35-136
4,4'-DDT	0.459	ND	0.388	85	22-146

Compound	Spike Added (mg/kg)	MSD Conc. (mg/kg)	MSD % Rec	RPD	QC Limits RPD	QC Limits % Rec
gamma-BHC (Lindane)	0.331	0.294	89	0	12	36-122
Heptachlor	0.313	0.277	89	1	13	42-126
Aldrin	0.268	0.240	90	2	12	39-117
Dieldrin	0.586	0.523	90	2	28	43-105
Endrin	0.604	0.545	90	0	22	35-136
4,4'-DDT	0.459	0.388	85	0	36	22-146

NA = Not Applicable
ND = Not Detected
MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 8270

Client: Soil Tech
Client Sample ID: NA
VISTA Sample ID: 925714-Blank
Sample Type: Soil
Date Sampled : NA
Date Received: NA
Date Extracted: 12/30/92
Date Analyzed: 01/05/93

Analyte	Result	Reporting Limit	Units
Phenol	<	330	mg/kg
Bis(2-Chloroethyl) Ether	<	330	mg/kg
2-Chlorophenol	<	330	mg/kg
1,3-Dichlorobenzene	<	330	mg/kg
1,4-Dichlorobenzene	<	330	mg/kg
Benzyl Alcohol	<	660	mg/kg
1,2-Dichlorobenzene	<	330	mg/kg
2-Methylphenol	<	330	mg/kg
Bis(2-Chloroisopropyl) Ether	<	330	mg/kg
4-Methylphenol	<	330	mg/kg
N-Nitroso-di-n-propylamine	<	330	mg/kg
Hexachloroethane	<	330	mg/kg
Nitrobenzene	<	330	mg/kg
Isophorone	<	330	mg/kg
2-Nitrophenol	<	330	mg/kg
2,4-Dimethylphenol	<	330	mg/kg
Benzoic Acid	<	1,700	mg/kg
Bis(2-Chloroethoxy)methane	<	330	mg/kg
2,4-Dichlorophenol	<	330	mg/kg
1,2,4-Trichlorobenzene	<	330	mg/kg
Naphthalene	<	330	mg/kg
4-Chloroaniline	<	660	mg/kg
Hexachlorobutadiene	<	330	mg/kg
4-Chloro-3-methylphenol	<	660	mg/kg
2-Methylnaphthalene	<	330	mg/kg
Hexachlorocyclopentadiene	<	330	mg/kg
2,4,6-Trichlorophenol	<	330	mg/kg
2,4,5-Trichlorophenol	<	330	mg/kg
2-Chloronaphthalene	<	330	mg/kg
2-Nitroaniline	<	1,700	mg/kg
Dimethyl Phthalate	<	330	mg/kg
Acenaphthylene	<	330	mg/kg
3-Nitroaniline	<	1,700	mg/kg
Acenaphthene	<	330	mg/kg
2,4-Dinitrophenol	<	1,700	mg/kg
4-Nitrophenol	<	1,700	mg/kg
Dibenzofuran	<	330	mg/kg

NA = Not Applicable
< = Compound not detected at or above the listed reporting limit.

EPA-CLP Target Compound List
Semivolatile Organic Compounds - EPA Method 8270
(continued

VISTA Sample ID: 926714-Blank

Analyte	Result	Reporting Limit	Units
2,4-Dinitrotoluene	<	330	mg/kg
2,6-Dinitrotoluene	<	330	mg/kg
Diethyl Phthalate	<	330	mg/kg
4-Chlorophenyl Phenyl Ether	<	330	mg/kg
Fluorene	<	330	mg/kg
4-Nitroaniline	<	1,700	mg/kg
4,6-Dinitro-2-methylphenol	<	1,700	mg/kg
N-Nitrosodiphenylamine	<	330	mg/kg
4-Bromophenyl Phenyl Ether	<	330	mg/kg
Hexachlorobenzene	<	330	mg/kg
Pentachlorophenol	<	1,700	mg/kg
Phenanthrene	<	330	mg/kg
Anthracene	<	330	mg/kg
Di-n-butyl Phthalate	<	330	mg/kg
Fluoranthene	<	330	mg/kg
Pyrene	<	330	mg/kg
Butylbenzyl Phthalate	<	330	mg/kg
3,3'-Dichlorobenzidine	<	660	mg/kg
Benzo(a)anthracene	<	330	mg/kg
Bis(2-Ethylhexyl) Phthalate	(97)*	330	mg/kg
Chrysene	<	330	mg/kg
Di-n-octyl Phthalate	<	330	mg/kg
Benzo(b)fluoranthene	<	330	mg/kg
Benzo(k)fluoranthene	<	330	mg/kg
Benzo(a)pyrene	<	330	mg/kg
Indeno(1,2,3-cd)pyrene	<	330	mg/kg
Dibenz(a,h)anthracene	<	330	mg/kg
Benzo(g,h,i)perylene	<	330	mg/kg

Surrogate Recoveries		QC Limits
Nitrobenzene-d_5	43	35-90
2-Fluorobiphenyl	60	27-99
Terphenyl-d_{14}	81	57-109
Phenol-d_6	[illegible]	36-102
2-Fluorophenol	[illegible]	16-87
2,4,6-Tribromophenol	[illegible]	10-131

* Detected below reporting limit; quantitation may be unreliable.
< = Compound not detected at or above the listed reporting limit.

Quality Assurance
Semivolatile Organics - EPA Method 8270
Matrix Spike Recovery and Precision

Client: Soil Tech
Client Sample ID: NA
VISTA Sample ID: 925714-BLSP
Sample Type: Soil
Date Sampled : NA
Date Received: NA
Date Extracted: 12/30/92
Date Analyzed: 01/05/93

Compound	Spike Added (mg/kg)	Sample Conc. (mg/kg)	MS Conc. (mg/kg)	MS % Rec	QC Limits % Rec
Phenol	3330	ND	3130	94	20-96
2-Chlorophenol	3330	ND	2220	67	24-99
1,4-Dichlorobenzene	1670	ND	978	59	28-95
Di-n-propylnitrosamine	1670	ND	968	58	22-112
1,2,4-Trichlorobenzene	1670	ND	811	49	23-115
4-Chloro-3-methylphenol	3330	ND	1960	59	21-117
Acenaphthene	1670	ND	1240	74	22-144
4-Nitrophenol	3330	ND	2350	71	10-126
2,4-Dinitrotoluene	1670	ND	1130	68	10-127
Pentachlorophenol	3330	ND	2260	68	10-133
Pyrene	1670	ND	1330	80	30-127

Compound	Spike Added (mg/kg)	MSD Conc. (mg/kg)	MSD % Rec	RPD	QC Limits RPD	QC Limits % Rec
Phenol	3330	2200	96	2	31	20-96
2-Chlorophenol	3330	2430	73	9	19	24-99
1,4-Dichlorobenzene	1670	1080	65	10	27	28-95
Di-n-propylnitrosamine	1670	1030	62	7	23	22-112
1,2,4-Trichlorobenzene	1670	1040	62	23	40	23-115
4-Chloro-3-methylphenol	3330	2240	67	13	33	21-117
Acenaphthene	1670	1370	82	10	19	22-144
4-Nitrophenol	3330	2620	79	11	29	10-126
2,4-Dinitrotoluene	1670	1290	77	12	28	10-127
Pentachlorophenol	3330	2470	74	8	47	10-133
Pyrene	1670	1510	90	12	31	30-127

ND = Not Detected
MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference

HAZEN RESEARCH, INC.
4601 Indiana St. · Golden, CO 80403
Tel : (303) 279-4501 · Telex 45-860

925714

CHAIN OF CUSTODY RECORD

No.	Project Name												
	ACS 4653a 9631-18												
Samplers *(Signature)*													
No.	Date	Time	Comp.	Grab	Station Location	No. of Containers	Pb, Cu (ICP)	Sb, As, Bi (ICP)					Remarks
	12/2	15:30			Feed 9-1571B	1	1	1					Hazen No 4653-1
	12/2	16:00			Feed 9-1267A	1	1	1					Hazen No 4653-3
	12/2	16:45			Feed 9-1267B	1	1	1					Hazen No 4653-2

Relinquished by: *(Signature)*	Date/Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date/Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date/Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date/Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date/Time	Received for laboratory by: *(Signature)*	Remarks:		

HUFFMAN

LABORATORIES, INC.

CUSTOMER #:
01510

DATE [illegible]
LAB# 10890
P.O. 3925
RECD 01/20[illegible]

ANALYSIS REPORT

BOB KECK
VISTA LABORATORIES, INC.
325 INTERLOCKEN PKWY #200
BROOMFIELD CO 80021

PROJ. # 935754-011-003

SEQUENCE/ SAMPLE ID	01 18.1-46532-2-S1	02 18.2-46532-2S2H	03 18.3-46532-2S2C
CARBONATE C---%	0.48	0.02	0.00
TOTAL CARBON--%	8.90	0.57	0.38
ORGANIC C-----%	8.45	0.55	0.38

THE SAMPLES ARE NOT HOMOGENEOUS.

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CUSTOMER #:
01510

DATE 2-17-93
LAB# 115993
P.O. 3950
RECD 02/02/93

ANALYSIS REPORT

BOB KECK
VISTA LABORATORIES, INC.
325 INTERLOCKEN PKWY #200
BROOMFIELD CO 80021

SEQUENCE/ SAMPLE NUMBER	ANALYSIS		
	CARBONATE C---%	TOTAL CARBON--%	ORGANIC C-----%
01/935805-003	0.07	0.53	0.46
02/935805-004	0.06	0.79	0.73
03/935805-005	<0.02	0.76	0.76
04/935805-006	<0.02	0.77	0.77

SAMPLE 01 - 18.6-46532-3S-S2H, SAMPLE 02 - 18.7-46532-3S-S2L, SAMPLE 03 - 18.9-46532-4S-S2H, SAMPLE 04 - 18.10-46532-4S-S2L

THE SAMPLES ARE NOT HOMOGENEOUS.

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Phone: 303) 278-4455 • FAX (303) 278-7012

CUSTOMER #:
01021

DATE 2/17/93
LAB# 116293
P.O. 1354
RECD 02/03/93

ANALYSIS REPORT

R. ROSTAD
HAZEN RESEARCH, INC.
4601 INDIANA ST.
GOLDEN CO 80403

SEQUENCE/ SAMPLE ID	01 B34/93-1	02 B34/93-2	03 B34/93-3
CARBONATE C---%	0.21	0.20	<0.02
TOTAL CARBON--%	0.28	0.26	0.05
ORGANIC C-----%	0.07	0.06	0.05

HUFFMAN
LABORATORIES, INC.
Quality Analytical Services Since 1936
4630 Indiana Street • Golden, CO 80403
Phone: (303) 278-4455 • FAX (303) 278-7[illegible]

CUSTOMER #:
01021

DATE 3/26/93
LAB# 137493
P.O. 1740
RECD 03/12/93

ANALYSIS REPORT

R. ROSTAD
HAZEN RESEARCH, INC.
4601 INDIANA ST.
GOLDEN CO 80403

SEQUENCE/ SAMPLE NUMBER	ANALYSIS			
	CARBONATE C---%	TOTAL CARBON--%	ORGANIC C-----%	TOT ORG C--MG/L
01/C226/93-1				254.
02/C227/93-1				4.
03/C228/93-1				3.
04/C229/93-1				54.
05/C241/93-1	0.56	4.57	4.01	
06/C241/93-2	<0.02	50.53	50.53	

SAMPLE C226/93-1 IS CLOUDY AND CONTAINS PARTICULATES.
SAMPLES C41/93-1 AND C241/93-2 ARE NOT HOMOGENEOUS.

Table 1

Summary of Sitewide Soil Remediation Levels and Concentrations

American Chemical Services NPL Site

Griffith, Indiana

Compound	Rem. Level (mg/kg)	Minimum (mg/kg)	Maximum (mg/kg)	Average Concentration (mg/kg) at: On-Site Cont.	Still Bot. Trtmt Lag.	Off-Site Cont	Kapica/ Pazmey	P... Defe...
Pesticides/PCBs (130 samples)								
alpha-BHC	0.0047	0.33	0.33	nd	nd	0.33	nd	
beta-BHC	0.016	0.8	0.8	nd	nd	0.8	nd	
gamma-BHC (Lindane)	0.046	1.1	1.1	nd	1.1	nd	nd	
Endosulfan 1	0.63	0.011	1.2	0.0115	1.2	nd	0.042	
Aldrin	0.002	0.013	7.7	nd	nd	3.86	0.088	
Heptachlor Epoxide	0.0033	0.013	0.013	nd	nd	0.013	nd	
4,4'-DDE	0.16	0.88	0.88	nd	nd	0.88	nd	
4,4'-DDD	0.12	0.025	3.3	nd	nd	3.3	77.7	
4,4'-DDT	0.088	0.05	12	0.07	8.35	1.7	nd	
PCBs	2	0.99	1,435	109	117	234	82.7	
Metals (52 samples)								
Antimony	15	3.7	152	5.3	28.75	46.24	41.9	
Barium	2,600	67.4	6,400	515	466	1,462	2,313	
Cadmium	51	0.05	1,700	0.72	14.73	102	5.36	
Chromium (VI)	1,400	4.6	3,750	32	196	253	792	
Lead	500	2.3	17,200	112	842	1,067	4,650	
TICs								
Propenyl Benzenes	320							
Ethyl Methyl Benzenes	4,900							
Diethyl benzenes	1,300							
Methyl Propyl Benzenes	490							
Dimethyl Ethyl Benzenes	1,300							
Oxygenated Benzenes	1,230							
Nitrogenated Benzenes	6.2							
Halogenated Alkanes	2.3							
n-chain Alkanes	750							
Branched Alkanes	77							
Methylated Napthalenes	85							
Cyclic Ketones	7.3							
Non-Cyclic Acids	1,0**							

Notes:

1. This table includes compounds for which ... remediation ... were ... than presented in ... in the ACS ROD - Table 8.
2. Concentrations in ACS were based on ... Table ... of the ROD.
3. Total chromium and total 1,2 ... concentrations ... remediation.
4. Average concentration shown is the arithmetic mean ... mean ... remediation ... Table ...
5. nd indicates the ... was not detected ...

...
...
...

ARZY

LETTER OF TRANSMITTAL

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REMARKS

Attached are the [illegible] results which were not included with the report issued to you on [illegible]. This report is now complete.

If you have any questions, please feel free to call.

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LABORATORY REPORT

Warzyn Inc.
P.O. Box 5385
Madison, Wisconsin 53705

Report Date: 2/23/93
Sample Received: 2/3/93

Project Name: American Chemical Services
Sample Description: 18.5-46532-35-S1
Sample No.: 41033

Compound	Concentration Found IN Sample (ppb)	Concentration Found IN Blank (ppb)	Method Detection Limit (MDL) ug/kg (ppb)	Quantitation Limit ug/kg (ppb)
Purgeables				
1. Chloromethane	<25,000	<1.0	25,000	125,000
2. Bromomethane	<25,000	<0.7	25,000	125,000
3. Vinyl chloride	<25,000	<0.7	25,000	125,000
4. Chloroethane	<25,000	<0.7	25,000	125,000
5. Dichloromethane	<25,000	<1.5	25,000	125,000
6. Acrolein	<25,000	<15.0	75,000	375,000
7. Acrylonitrile	<25,000	<5.0	25,000	125,000
8. Trichlorofluoromethane	<25,000	<0.5	25,000	125,000
9. 1,1-Dichloroethene	1,000,000	<0.5	25,000	125,000
10. 1,1-Dichloroethane	<25,000	<0.5	25,000	125,000
11. trans-1,2-Dichloroethene	<25,000	<0.5	25,000	125,000
12. Chloroform	<25,000	<0.5	25,000	125,000
13. 1,2-Dichloroethane	2,200,000	<0.5	25,000	125,000
14. 1,1,1-Trichloroethane	1,100,000	<0.5	25,000	125,000
15. Carbon tetrachloride	<25,000	<0.5	25,000	125,000
16. Bromodichloromethane	<25,000	<0.5	25,000	125,000
17. 1,2-Dichloropropane	<25,000	<0.5	25,000	125,000
18. trans-1,3-Dichloropropene	<25,000	<0.5	25,000	125,000
19. Trichloroethene	2,500,000	<0.5	25,000	125,000
20. Benzene	1,200,000	<0.5	25,000	125,000
21. Dibromochloromethane	25,000	<0.5	25,000	125,000
22. cis-1,3-Dichloropropene	25,000	<0.5	25,000	125,000
23. 1,1,2-Trichloroethane	25,000	<0.5	25,000	125,000
24. 2-Chloroethylvinylether	25,000	<0.5	25,000	125,000

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708/967-6666
FAX: 708/967-5735

LABORATORY REPORT

Kamyn Inc.
P.O. Box 5385
Madison, Wisconsin 53705

Report Date: 2/23/93
Sample Received: 2/3/93

Project Name: American Chemical Services
Sample Description: 18.5-46532-35-SI
Sample No.: 41033

Compound Purgeables	Concentration Found IN Sample (ppb)	 Blank (ppb)	Method Detection Limit (MDL) ug/kg (ppb)	Quantitation Limit ug/kg (ppb)
25. Bromoform	<25,000	<4.[illegible]	25,000	125,000
26. Tetrachloroethene	874,000	<[illegible]	25,000	125,000
27. 1,1,2,2-Tetrachloroethane	<25,000	<[illegible]	25,000	125,000
28. Toluene	783,000	<[illegible]	25,000	125,000
29. Chlorobenzene	<25,000	<[illegible]	25,000	125,000
30. Ethylbenzene	14[illegible],000	<[illegible]	25,000	125,000
31. Xylenes	830,000	<[illegible]	[illegible]0,000	500,000
32. Styrene	<100,000	<[illegible]	[illegible]0,000	500,000
33. cis-1,2-dichloroethene	<100,000	<[illegible]	[illegible]0,000	500,000
34. Acetone	113,000	<[illegible]	[illegible]0,000	500,000
35. MEK	<1,400	<[illegible]	[illegible],000	500,000
36. MIK	<100,000	<[illegible]	[illegible]0,000	500,000
37. [illegible]	<[illegible],000	<[illegible]	[illegible],000	500,000

All results are reported on a dry weight basis unless otherwise indicated.

Methods performed according to SW-846, Third Edition, Final Update I, July 1992.

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LABORATORY REPORT

41033

Marcyn Inc.
P.O. Box 5385
Madison Wisconsin 53705

Report Date: 2/24/93
Sample Received: 2/3/93

Project Name: American Chemical Services
Sample Description: 18.5-46532-35-S1
Sample No.: 41033

Compound Base/Neutral Extractables	Concentration Found In Sample	Concentration Found In Blank	Method Detection Limit (MDL) ug/kg (ppb)	Quantitation Limit ug/kg (ppb)
	ppb	ppb		
1. N-Nitrosodimethylamine	<700	<0.7	700	1
2. Bis(2-chloroethyl)ether	<500	<0.5	500	1
3. 1,3-Dichlorobenzene	<400	<0.4	400	1
4. 1,4-Dichlorobenzene	<400	<0.4	400	1
5. 1,2-Dichlorobenzene	<400	<0.4	400	1
6. Bis(2-chloroisopropyl)ether	<1200	<1.2	1200	1
7. Hexachloroethane	<700	<0.7	700	1
8. N-Nitrosodi-n-propylamine	<1500	<1.5	1500	1
9. Nitrobenzene	<1800	<1.8	1800	1
10. Isophorone	<300	<0.3	300	1
11. Bis(2-chloroethoxy)methane	<400	<0.4	400	1
12. 1,2,4-Trichlorobenzene	<400	<0.4	400	1
13. Naphthalene	[illegible]	<0.10	100	1
14. Hexachlorobutadiene	[illegible]	[illegible]	[illegible]	[illegible]
15. Hexachlorocyclopentadiene	[illegible]	[illegible]	[illegible]	[illegible]
16. 2-Chloronaphthalene	[illegible]	[illegible]	[illegible]	[illegible]
17. Acenaphthylene	[illegible]	[illegible]	[illegible]	[illegible]
18. Dimethylphthalate	[illegible]	[illegible]	[illegible]	[illegible]
19. 2,6-Dinitrotoluene	[illegible]	[illegible]	[illegible]	[illegible]
20. Acenaphthene	[illegible]	[illegible]	[illegible]	[illegible]
21. 2,4-Dinitrotoluene	[illegible]	[illegible]	[illegible]	[illegible]
22. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
23. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
24. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]

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LABORATORY REPORT

Warzyn Inc.
P.O. Box 5385
Madison Wisconsin 53705

Report Date: [illegible]
Sample Received: [illegible]

Project Name: American Chemical Services
Sample Description: 18.5-46532-35-S1
Sample No.: 41033

Compound Base/Neutral Extractables	Concentration Found In Sample	Concentration Found In Blank	Method Detection Limit (MDL) ug/kg (ppb)	Quantitation Limit ug/kg
	ppb	(ppb)		
25. N-Nitrosodiphenylamine	<500	<1.5	500	
26. Diphenylhydrazine	<[illegible]	<1.5	[illegible]	
27. 4-Bromophenyl phenyl ether	<[illegible]	<0.5	[illegible]	
28. Hexachlorobenzene	<[illegible]	<1.5	[illegible]	
29. Phenanthrene	12[illegible]	<0.13	13	
30. Anthracene	<13	<0.13	13	
31. Di-n-butylphthalate	337[illegible]	<0.5	[illegible]	
32. Fluoranthene	<13	<0.13	13	
33. Benzidine	<[illegible]	<2.5	[illegible]	
34. Pyrene	<13	<0.13	13	
35. Butyl benzyl phthalate	<[illegible]	<1.5	[illegible]	
36. Benzo(a)anthracene	<13	<0.13	13	
37. Chrysene	7[illegible]	<0.13	13	
38. 3,3'-Dichlorobenzidine	<[illegible]	<1.5	[illegible]	
39. Bis (2-ethylhexyl) phthalate	[illegible]	<1.5	25	
40. Di-n-octylphthalate	<[illegible]	<1.5	25	
41. Benzo (b) fluoranthene	[illegible]	<0.13	13	
42. Benzo (k) fluoranthene	<13	<0.13	13	
43. Benzo (a) pyrene	[illegible]	<0.13	[illegible]	
44. Indeno (1,2,3-cd) pyrene	[illegible]	<0.13	[illegible]	
45. Dibenz (a,h) anthracene	[illegible]	<0.13	[illegible]	
46. Benzo (g,h,i) perylene	[illegible]	<0.13	[illegible]	

All results expressed in ppb unless otherwise indicated.

Methods performed according to Standard "Test Methods for Evaluating [illegible]

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LABORATORY REPORT

Warzyn Inc.
P.O. Box 5385
Madison, Wisconsin 53[illegible]

Report Date: [illegible]
Sample Received: [illegible]

Project Name: American Chemical Services
Sample Description: 18.5-46532-35-S1
Sample No.: 41033

Compound	Concentration Found In Sample	Concentration Found In Blank	Method Detection Limit (MDL) ug/kg (ppb)	Quantitation Limit ug/kg (ppb)
Acid Extractables				
1. Phenol	1540	<0.4	40	1
2. 2-Chlorophenol	<[illegible]	<2.[illegible]	80	1
3. 2-Nitrophenol	<[illegible]	<1.[illegible]	1900	1
4. 2,4-Dimethylphenol	<[illegible]	<0.5	530	1
5. 2,4-Trichlorophenol	[illegible]	<1.[illegible]	170	1
6. p-Chloro-m-cresol	<[illegible]	<2.[illegible]	220	1
7. 2,4,6-Trichlorophenol	<[illegible]	<2.[illegible]	2200	1
8. 2,4-Dinitrophenol	<[illegible]	<4.[illegible]	3900	5
9. 4-Nitrophenol	<[illegible]	<5.[illegible]	5400	5
10. 4,6-Dinitro-o-cresol	<[illegible]	<2.[illegible]	8600	10
11. Pentachlorophenol	<[illegible]	<7.0	730	5
12. PCP	[illegible]	<1.[illegible]	1[illegible]	1
13. [illegible]	[illegible]	<[illegible]	[illegible]	[illegible]
14. [illegible]		<[illegible]	[illegible]	[illegible]

[illegible] indicates [illegible] indicates.

Methods performed according to [illegible] Test Methods [illegible].

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LABORATORY REPORT

Report Date: 2/23/93
Sample Received: 2/3/93

Project Name: American Chemical Services
Sample Description: 18.S-46532-45-S1
Sample No.: 41034

Compound Purgeables	Concentration Found IN Sample (ppb)	Blank (ppb)	Method Detection Limit (MDL) ug/kg (ppb)	Quantitation Limit ug/kg (ppb)
1. Chloromethane	6,340,000	<1.0	60,000	[illegible]
2. Bromomethane	5,400,000	<1.7	60,000	[illegible]
3. Vinyl chloride	<60,000	<0.7	60,000	[illegible]
4. Chloroethane	<60,000	<1.7	60,000	[illegible]
5. Dichloromethane	<[illegible]	<[illegible]	[illegible]	[illegible]
6. Acrolein	<[illegible]	<[illegible]	[illegible]	[illegible]
7. Acrylonitrile	<160,000	<5.0	160,000	[illegible]
8. Trichlorofluoromethane	<60,000	<1.5	60,000	[illegible]
9. 1,1-Dichloroethane	<60,000	<1.5	60,000	[illegible]
10. 1,1-Dichloroethane	<60,000	<1.5	60,000	[illegible]
11. trans-1,2-Dichloroethane	<[illegible]	<1.5	60,000	[illegible]
12. Chloroform	<[illegible]	<1.5	60,000	[illegible]
13. 1,2-Dichloroethane	<[illegible]	<[illegible]	[illegible]	[illegible]
14. 1,1,1-Trichloroethane	[illegible]	<[illegible]	[illegible]	[illegible]
15. Carbon tetrachloride	<[illegible]	<[illegible]	[illegible]	[illegible]
16. Bromodichloromethane	<[illegible]	<[illegible]	[illegible]	[illegible]
17. 1,2-Dichloropropane	<[illegible]	<[illegible]	[illegible]	[illegible]
[illegible]	<[illegible]	<[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

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5100 North Austin Avenue
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LABORATORY REPORT

[illegible]-A

Warzyn Inc.
P.O. Box 5385
Madison, Wisconsin 53705

Report Date: 2/23/93
Sample Received: 2/3/93

Project Name: American Chemical Services
Sample Description: 1S.S-46532-45-S1
Sample No.: 41034

Compound Purgeables	Concentration Found IN Sample (ppb)	Concentration Found IN Blank (ppb)	Method Detection Limit (MDL) ug/kg (ppb)	Quantitation Limit ug/kg (ppb)
25. Bromoform	<120,000	<4.7	120,000	[illegible]
26. Tetrachloroethene	3,900,000	<3.7	60,000	[illegible]
27. 1,1,2,2-Tetrachloroethane	<120,000	<3.[illegible]	120,000	[illegible]
28. Toluene	353,000	<3.5	60,000	[illegible]
29. Chlorobenzene	<[illegible],000	<[illegible]	60,000	[illegible]
30. Ethylbenzene	15[illegible],000	<[illegible]	60,000	[illegible]
31. Xylenes	1,960,000	<[illegible]	60,000	[illegible]
32. Styrene	<240,000	<[illegible]	240,000	[illegible]
33. Vinyl Acetate	<240,000	<[illegible]	240,000	[illegible]
34. Acetone	[illegible],000,000	<[illegible]	500,000	[illegible]
35. MEK	[illegible],000,000	<[illegible]	240,000	[illegible]
36. MIK	<24[illegible],000	<[illegible]	240,000	[illegible]
37. [illegible]	<24[illegible],000	<[illegible]	240,000	[illegible]
38. [illegible]	24[illegible],000	<[illegible]	24[illegible],000	[illegible]

[illegible]

[illegible]

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LABORATORY REPORT

Warzyn Inc.
P.O. Box 5385
Madison Wisconsin 53705

Report Date: 2/24/[illegible]
Sample Received: 2/[illegible]

Project Name: American Chemical Services
Sample Description: 18.8-46532-45-S1 Liquid Phase
Sample No.: 41034

Compound	Concentration Found In Sample (ppb)	Concentration Found In Blank (ppb)	Method Detection Limit (MDL) ug/L (ppb)	Quantitation Limit ug/L
Base/Neutral Extractables				
1. N-Nitrosodimethylamine	<700	<0.7	700	
2. Bis(2-chloroethyl)ether	<500	<0.5	500	
3. 1,3-Dichlorobenzene	<400	<0.4	400	
4. 1,4-Dichlorobenzene	<400	<0.4	400	
5. 1,2-Dichlorobenzene	<400	<0.4	400	
6. Bis(2-chloroisopropyl) ether	<1200	<1.2	1200	
7. Hexachloroethane	<700	<0.7	700	
8. N-Nitrosodi-n-propylamine	<1500	<1.5	1500	
9. Nitrobenzene	<1800	<1.8	1800	
10. Isophorone	<2700	<2.7	2700	
11. Bis(2-chloroethoxy) methane	<400	<0.4	400	
12. 1,2,4-Trichlorobenzene	<400	<0.4	400	
13. Naphthalene	4400	<0.13	130	
14. Hexachlorobutadiene	<500	<0.5	500	
15. Hexachlorocyclopentadiene	<4500	<4.5	4500	
16. 2-Chloronaphthalene	<0.2	<0.2		
17. Acenaphthylene	<130	<0.13	130	
18. Dimethylphthalate	<0.1	<0.1	1	
19. 2,6-Dinitrotoluene	<4	<4	4	
20. Acenaphthene	<130	<0.13	130	
21. 2,4-Dinitrotoluene	<400	<0.4	400	
22. Fluorene	<0.1	<0.1	1	
23. Diethylphthalate	<0.1	<0.1	1	
24. 4-Chlorophenyl phenyl ether	<1	<1	1	

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[illegible]
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LABORATORY REPORT

Marcym Inc.
P.O. Box 5385
Madison Wisconsin 53705

Project Name: American Chemical Services
Sample Description: 18.S-46532-45-S1 Liquid Phase
Sample No.: 41034

Compound Base/Neutral Extractables	Concentration Found In Sample (ppb)	Blank (ppb)	Method Detection Limit (MDL) ug/L (ppb)	Quanti[illegible] ug/[illegible]
25. N-Nitrosodiphenylamine	<5.0	<[illegible]	[illegible]	
26. Diphenylhydrazine	<[illegible]	<[illegible]	[illegible]	
27. 4-Bromophenyl phenyl ether	<[illegible]	<[illegible]	[illegible]	
28. Hexachlorobenzene	[illegible]	<[illegible]	[illegible]	
29. Phenanthrene	[illegible]	<[illegible]	[illegible]	
30. Anthracene	[illegible]	[illegible]	[illegible]	
31. Di-n-butylphthalate	[illegible]	<[illegible]	[illegible]	
32. Fluoranthene	[illegible]	<[illegible]	[illegible]	
33. Benzidine	[illegible]	<[illegible]	[illegible]	
34. Pyrene	[illegible]	<[illegible]	[illegible]	
35. Butyl benzyl phthalate	[illegible]	<[illegible]	[illegible]	
36. Benzo anthracene	[illegible]	<[illegible]	[illegible]	
37. Chrysene	[illegible]	<[illegible]	[illegible]	
38. 3,3'-Dichlorobenzidine	[illegible]	<[illegible]	[illegible]	
39. Bis(2-ethylhexyl) [illegible]		[illegible]	[illegible]	
40. [illegible]	[illegible]	[illegible]	[illegible]	
41. [illegible]		[illegible]	[illegible]	
42. Benzo [illegible]		[illegible]		
43. [illegible]		[illegible]	[illegible]	
44. [illegible]		[illegible]	[illegible]	
45. [illegible]		[illegible]	[illegible]	
46. [illegible]				

[illegible]

[illegible]

ENVIRONMENTAL
MONITORING AND
TECHNOLOGIES, INC.

9100 North Austin Avenue
Morton Grove, Illinois 60053-3203
708/967-6666
FAX: 708/967-6735

LABORATORY REPORT

Waterpyn Inc.
P.O. Box 5385
Madison, Wisconsin 53705

Report Date: 2/21
Sample Received: 2/3

Project Name: American Chemical Services
Sample Description: 18.S-46532-45-S1 Liquid phase
Sample No.: 41034

Compound	Concentration Found In Sample	Concentration Found In Blank	Method Detection Limit (MDL) ug/L (ppb)	Quantitation Limit ug/L (ppb)
Acid Extractables				
1. Phenol	<400	<0.4	400	1000
2. 2-Chlorophenol	<900	<0.5	900	1500
3. 2-Nitrophenol	<1800	<1.5	1800	3000
4. 2,4-Dimethylphenol	<500	<1.5	500	1000
5. 2,4-Dichlorophenol	<170	<1.7	170	1000
6. p-Chloro-m-cresol	<2200	<2.2	2200	5000
7. 2,4,6-Trichlorophenol	<220	<2.2	220	1000
8. 2,4-Dinitrophenol	<4500	<4.5	4500	10000
9. 4-Nitrophenol	<3400	<3.4	3400	5000
10. 4,6-Dinitro-o-cresol	<680	<1.7	680	5000
11. Pentachlorophenol	<730	<7.3	730	1000
12. PCP 1254	1420	<1.7	1700	5000
13. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible] expressed as ppb unless otherwise noted.

Method used [illegible] "Test Methods for Evaluating Solid [illegible]

ENVIRONMENTAL MONITORING AND TECHNOLOGIES, INC.

[illegible] North [illegible] Avenue
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708 967-6666
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LABORATORY REPORT

[illegible]
[illegible] Box 5385
Madison Wisconsin 53705

Report Date: 2 24 [illegible]
Sample Received: [illegible]

Project Name: American Chemical Services
Sample Description: 18.S-46532-45-S1 Solid Phase
Sample No.: 41034

Compound Base/Neutral Extractables	Concentration Found In Sample ppb	Concentration Found In Blank ppb	Method Detection Limit (MDL) ug/kg (ppb)	Quantitation Limit ug/kg
1. N-Nitrosodimethylamine	<35	<1.7	350	
2. Bis(2-chloroethyl)ether	222	<1.5	150	
3. 1,3-Dichlorobenzene	<2[illegible]	<[illegible].4	[illegible]	
4. 1,4-Dichlorobenzene	<[illegible]	<[illegible]	[illegible]	
5. 1,2-Dichlorobenzene	<45	<[illegible]	45[illegible]	
6. Bis(2-chloroisopropyl)ether	[illegible]	[illegible]	[illegible]	
7. Hexachloroethane	[illegible]	[illegible]	[illegible]	
8. N-Nitrosodi-n-propylamine	<75	<1.[illegible]	75[illegible]	
9. Nitrobenzene	<[illegible]	[illegible]	[illegible]	
10. Isophorone	22[illegible]	[illegible]	[illegible]	
11. Bis(2-chloroethoxy)methane	<2[illegible]	[illegible].4	[illegible]	
12. 1,2,4-Trichlorobenzene	<2	<[illegible].4	[illegible]	
13. Naphthalene	[illegible]	<[illegible]	[illegible]	
14. Hexachlorobutadiene	[illegible]	[illegible]	[illegible]	
15. [illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	

Table 1

Summary of Sitewide Soil Remediation Levels and Concentrations

American Chemical Services NPL Site

Griffith, Indiana

Compound	Rem. Level (mg/kg)	Minimum (mg/kg)	Maximum (mg/kg)	Average Concentration (mg/kg) at: On-Site Cont.	Still Bot. Trtmt Lag.	Off-Site Cont	Kapica/ Pazmey	Positive Detects
Volatiles (135 samples)								
Vinyl Chloride	0.031	2.9	2.9	nd	nd	2.9	nd	1
Chloroethane	2,700	0.001	2	0.0015	nd	0.95	0.012	6
Methylene Chloride	6.2	0.012	260	nd	136	31.5	0.406	13
Acetone	2,400	0.018	34,000	2.9	10	1,549	2.70	33
1,1-Dichloroethene	0.098	0.003	390	nd	nd	117	nd	4
1,2-Dichloroethene (cis)	250	0.002	120	0.606	21.9	5.55	7.26	55
Chloroform	9.5	0.001	2,800	0.97	286	223	0.004	49
1,2-Dichloroethane	0.64	0.001	440	0.486	15.8	34.6	0.044	23
2-Butanone	620	0.004	99,000	0.102	59.5	3,760	30	63
1,1,1-Trichloroethane	2,300	0.001	150,000	885	1,093	5,679	0.217	76
Carbon Tetrachloride	0.38	530	3,600	nd	2,065	nd	nd	2
1,2-Dichloropropane	0.42	0.001	23	nd	nd	3.04	0.027	13
Trichloroethene	5.3	0.003	19,000	5.3	184	927	7.9	71
1,1,2-Trichloroethane	0.51	0.001	400	0.035	2.71	94.6	nd	13
Benzene	1	0.001	7,100	205	39	97.3	4.1	45
4-Methyl-2-pentanone	630	0.002	61,000	0.119	235	2,536	65.6	24
Tetrachloroethene	1.1	0.002	46,000	431	266	2,161	115	41
1,1,2,2-Tetrachloroethane	0.28	0.002	3.9	0.779	nd	0.017	nd	8
Toluene	5,000	0.001	200,000	5,293	1,704	3,957	1,390	125
Chlorobenzene	150	0.002	1,000	0.104	0.002	177	6.67	19
Ethylbenzene	1,300	0.002	23,000	194	751	943	312	123
Styrene	1.7	0.001	310	3.1	54	87	7.1	33
Xylenes (mixed)	26,000	0.002	100,000	791	1,978	3,735	1,433	127
Semi-Volatiles (85 samples)								
bis (2-chloroethyl) ether	0.027	0.099	200	nd	13.7	48	nd	32
1,4-Dichlorobenzene	2.4	0.046	11	0.85	nd	3.15	nd	14
Isophorone	7.2	0.041	3,600	46	314	443	35.5	57
1,2,4-Trichlorobenzene	16	0.054	79	nd	1,882	13.5	nd	14
Napthalene	82	0.054	2,400	19.5	97	282	23	73
Hexachlorobutadiene	0.36	0.055	150	3.7	7.68	33	nd	23
2,6-Dinitrotoluene	0.044	3.5	3.5	nd	nd	3.5	nd	1
2,4-Dinitrotoluene	0.044	0.84	0.84	nd	nd	nd	0.84	1
n-Nitrosodiphenylamine	12	0.18	53	nd	23	11.1	3.1	11
Hexachlorobenzene	0.018	0.25	11	nd	3.982	5.97	nd	6
Pentachlorophenol	0.43	0.045	160	1.4	14	44.3	5.4	21
bis 2-ethylhexyl Phthalate	1.1	0.039	14,000	13.5	275	1,526	1.55	57
di-n-butylphthalate	2,300	0.039	3,400	10.55	57.8	327	2.4	32
cPAHs	0.0025	0.254	75.3	254	1.03	22.8	0.87	12

Table 1

Summary of Sitewide Soil Remediation Levels and Concentrations

American Chemical Services NPL Site

Griffith, Indiana

Compound	Rem. Level (mg/kg)	Minimum (mg/kg)	Maximum (mg/kg)	Average Concentration (mg/kg) at: On-Site Cont.	Still Bot. Trtmt Lag.	Off-Site Cont	Kapica/ Pazmey	P... Detect
Pesticides/PCBs (130 samples)								
alpha-BHC	0.0047	0.33	0.33	nd	nd	0.33	nd	
beta-BHC	0.016	0.8	0.8	nd	nd	0.8	nd	
gamma-BHC (Lindane)	0.046	1.1	1.1	nd	1.1	nd	nd	
Endosulfan I	0.63	0.011	1.2	0.0115	1.2	nd	0.042	
Aldrin	0.002	0.013	7.7	nd	nd	3.86	0.088	
Heptachlor Epoxide	0.0033	0.013	0.013	nd	nd	0.013	nd	
4,4'-DDE	0.16	0.88	0.88	nd	nd	0.88	nd	
4,4'-DDD	0.12	0.025	3.3	nd	nd	3.3	77.7	
4,4'-DDT	0.088	0.05	12	0.07	8.35	1.7	nd	
PCBs	2	0.99	1,435	109	117	234	82.7	
Metals (52 samples)								
Antimony	15	3.7	152	5.3	28.75	46.24	41.9	
Barium	2,600	67.4	6,400	515	466	1,462	2,313	
Cadmium	51	0.05	1,700	0.72	14.73	102	5.36	
Chromium (VI)	1,400	4.6	3,750	32	196	253	792	
Lead	500	2.3	17,200	112	842	1,067	4,650	
TICs								
Propenyl Benzenes	320							
Ethyl Methyl Benzenes	4,900							
Diethyl benzenes	1,300							
Methyl Propyl Benzenes	400							
Dimethyl Ethyl Benzenes	1,300							
Oxygenated Benzenes	1,270							
Nitrogenated Benzenes	9.2							
Halogenated Alkanes	2,3...							
n-chain Alkanes	26...							
Branched Alkanes	77...							
Methylated Napthalenes	85							
Cyclic Ketones	7.3							
Non-Cyclic Acids	1,0...							

Notes:

1. This table includes compounds for which ... have been presented in the ACS ROD (Table ...
2. Concentrations at ACSs were taken from Table ... (Table ... of this table).
3. Total chromium and total 1,2 ... were used to ... concentration.
4. Average concentration shown is the arithmetic mean of ... detection limit ...
5. nd indicates the compound was not detected in that ...